ICT in Rural Primary Schools in Nepal: Context and Teachers' Experiences

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By

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Dedication

To my mother, Topali Maski Rana for her priceless love and care, and for her lonely struggle since our father passed away at the age of 35

To my elder brothers Om and Bin who sacrificed their desires and interests for my schooling and bright future

To my wife – Sunita Maski Rana, daughters – Samikshya and Sadikshya

Sorry for not being around with you for such a long time!

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Abstract

This thesis investigates and reports aspects of Nepal's progress in implementing ICT in education in rural primary schools. It examines the government's policy for ICT in education and the context in which it needs to be translated into practice. That context includes the development of successive policies and curriculum plans, the aspirational goals for ICT in education, the international literature about ICT that influences policy, the education system of Nepal, the varying ways teachers are appointed and trained, the role of NGOs in providing infrastructures and training, characteristics and resources of the rural context and the resources within rural schools and communities. It also includes the impact of the devastating 2015 earthquake on rural life generally, and on schools' capacity to teach with ICT in particular.

Central to the study are the experiences and perceptions of sixteen rural primary teachers from five schools across Nepal. The study foregrounds their practices of using ICT and their understanding of the uses of ICT. It also examines their experiences of training to use ICT, the resources they have available and how they use them, and the impact of the earthquake on their lives and work. In addition, it reports their reflections about the wider aspects of educational development, appointment of teachers and teacher training.

The study investigates the development of Nepal's ICT education policy and its connection with international ICT development. It examines how the Government of Nepal works to integrate ICT in education and the potential risks that are involved in the current strategy. It also reports a great gap between Nepal's current practices of ICT in rural primary schools and western development of ICT in educational practices.

This is a qualitative case study based on interpretive design. A sociocultural approach prompted investigation of the context and the gathering of thick data through interviews, open conversations with the participants, observation of participants' teaching activities with digital technology and the review of relevant policies, reports and other archived documents, open publications and websites.

The findings of the research provoke questions about the extent to which the aspirations of government policy for ICT in education can be realised in rural schools in the current context of resourcing, training and lack of internet access, and about the sustainability of the current resourcing of ICT infrastructures. The current strategy of providing ICT supports to the rural state schools come not from the government's fund but from development NGOs, and these will stop their service after certain time. The study also found that differences in teachers' status and salary, limited ICT training for teachers and lack of web access constrained teachers' use of ICT in their educational activities, although there was strong evidence of student engagement with the digital devices and of a changing classroom culture. The occurrence of the massive 2015 earthquake in the early stages of the study further highlighted the fragility of initiatives to develop ICT resources and practices in rural schools.

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Chapter I: Introduction

This study examines rural primary school teachers' practice and understanding of information and communication technology (ICT) in education in Nepal. It also investigates the national context in which teachers work and in which policy for education has evolved, the role of non-government agencies in resourcing ICT development, and it examines how the major earthquake in Nepal on 25th April 2015 impacted on the use of ICT in schools. As a result of the impacts of the earthquakes, the study explored some interconnections between technology and various social, economic and psychological aspects of human life.

This research has potential significance for several reasons. Firstly, there is very little comprehensive research about the development of ICT in primary education in Nepal generally, and even less about rural areas. Secondly, the government of Nepal has articulated policy that emphasises the strategic importance of ICT in education, but there appears to be no evidence of corresponding resourcing or even of considered planning for implementation of ICT. Moreover, the majority of the population live in rural areas, but there is very little in national policy that addresses the feasibility of ICT use in rural schools. Nor is there any substantive discussion in the research literature of the problems faced by rural schools in seeking to utilise ICT in their teaching. This research seeks to fill some of that gap.

In developing this study I have sought to deepen my understanding of the role of ICT in education by reading previous research, published journals, books, newspapers and other publications. Especially useful was my second Masters in Education at the University of Bedfordshire in England in 2009-10 and in particular the module *Resources and e-based learning*. During my Masters study and the following two years of my stay in England, I heard and read about information and communication technology thriving in Nepal. When I had left Nepal to go to England in mid-2009, Wi-Fi was not publicly available. When I returned to Nepal in the early March 2013, internet was accessible for those in the cities and small towns. The 3G mobile data was widespread throughout the country. I also followed the growth of digital technology used in education through websites, newspapers and periodicals in Nepal.

When I found there were a few schools in rural Nepal using digital technology in teaching and learning, it inspired me to study this field.

The international literature (Armstrong, 2014; Bate, MacNish & Males, 2012; Martin, 2006) reflects that integration of ICT as tools for teaching and learning has both strengths and weaknesses. Although there are many challenges in integrating ICT in instructional activities in the classroom, its use seems inevitable in and out of school life because the youth generation have digital technologies outside school particularly in urban areas. Previous research (Eady & Lockyer, 2013; Ott & Pozzi, 2011) has suggested that the use of digital technologies in teaching and learning may help the younger generation use them in a meaningful way. Therefore, this study seeks to explore the use of and the space for ICT in the rural context of Nepal.

This thesis locates the use of ICT in teaching activities in rural primary schools in Nepal within the wider context of school education and of Nepali policy. Thus, there are three different contextual frameworks that are relevant to this study: the rural context in which the schools are located, the political and urban context of Kathmandu in which policy is developed, and the international western context in which most of the research about and theorisation of ICT development in education has taken place. Particularly relevant to this investigation is the tension between the rural context and the city desks where policy is developed in the capital city of Nepal. Not only does education policy development in Nepal take place in Kathmandu, an urban environment, but policy developers are informed by an international and predominantly western context of information about ICT development. Thus, in the process of Nepal's education policy development and implementation there remain significant gaps between identifying the different needs and resources of rural and urban contexts and how these impact on ICT practices. I examine and discuss the gaps in this thesis.

The chapters that follow examine a range of factors including the characteristics of the rural context, the predominance of a low-income society, lack of government funding for ICT infrastructure and lack of government internet in rural areas. These factors, separately and through their interconnections, impact on the effectiveness of the Nepali government's stated aim to use ICT to transform traditional education into

a modern learning environment. These factors will need to be strategically addressed if policy is to be implemented.

Unfortunately the April 2015 earthquake heavily damaged social, economic and educational aspects of Nepal. Many people migrated to new places in search of shelter, food, security, job and education after the disaster. Community life became much harder in affected rural areas where the people had lost their properties and schools, and had to struggle with limited sources for survival. The disaster also impacted on the use of ICT in many rural primary schools, and I examine aspects of that impact.

In addition to investigating rural schools' ICT practices and the context in which they take place, I have also explored the fragile policy in Nepal of ICT integration and educational transformation. Teachers' practices are shaped largely by education policy, funding for ICT infrastructures and the provision of teacher training. Accordingly I have considered it important to investigate the extent to which the government of Nepal allocates (or does not allocate) budget for ICT infrastructures to primary schools and the extent to which it allows non-government organisations (NGOs) to invest in ICT infrastructure and teacher training to execute the policy of ICT integration in school education. Thus, the role of NGOs in resourcing and servicing ICT integration in rural primary schools is an important focus in my research.

The following sections provide the background of the study in terms of ICT in an international context, the education system in Nepal, ICT in Nepal's national education context, and state the purpose of the study and the research questions that this study seeks to answer.

Background

There are many schools in remote villages of Nepal seeking a change from the traditional way of teaching and learning. Many government schools have adopted digital technology in classroom teaching and learning in the recent years to bring changes in existing strategies of teaching. The Government of Nepal is normally the largest funder of education in Nepal and has emphasised a vision of transformation of traditional forms of schooling through digital technology in teaching and learning.

After a beginning with two schools in 2008, the Department of Education in the Ministry of Education is currently working with Open Learning Exchange (OLE) in a total of 225 primary schools in 34 districts (OLE, 2017 March 15). Unfortunately, the major earthquakes in Nepal in April 2015 have destroyed at least 30,756 classrooms and damaged about 16,813 classrooms in over 8308 schools in 53 district in Nepal (ICIMOD, 2015).

Before continuing to describe the background of this study it is important to define what is meant by ICT. Information and communication technology (ICT) denotes any communication device or application that has the potentiality of producing information, can store and communicate information. These may be electronic devices such as radio, television, computer, mobile, and other digital devices, as well as software applications associated with these devices such as digital learning programmes, voice chat and video conferencing. The technologies are designed innovative devices that continually change. At the same time, schools and teachers are trying to incorporate ICT in educational activities although these are constantly changing and developing. Somekh (2007) pointed out that it demands considerable attention from technicians to ensure that the work of administration and teachers will not be lost in the case of a breakdown. However, teachers who use this innovative ICT in their teaching and learning have to depend on the reliability of the technologies and their installation. In addition, Somekh (2007) also stressed that for ICT to be used pedagogically to transform students' learning, teachers and students should have widespread access to internet-connected ICT to utilise in their flexible time.

How teachers use these available technologies makes a difference in the effectiveness of the ICT which locates teachers in a challenging position (Loveless, 2003b). Galway (2013) focused on the social context in which education takes place and in which teacher education programmes are to be implemented. He emphasised that the social context often hinders the implementation of ICT in teaching and learning. Other complexities are what should be included in curriculum, how the schools should structure their programmes and distributions, and what the teachers should know and be able to do (Galway, *ibid*). To overcome these challenges, he suggested we can explore the potential of ICT in pedagogics and transform the traditional form of instructional activities in the classroom.

The globalisation of ICT in teaching and learning has influenced every country to some degree. According to different contexts, there are various complications in the planning of ICT in education, and in implementing and evaluating programmes. In Nepal, a common problem is geography as hills and mountains cover 83% of the total land. The lowest level land of Nepal lies at 50 meters above sea level whereas the highest is Mt Everest at 8848 metres above sea leave. Topographically Nepal has three regions: Himalaya, Hills and Terai which run almost parallel from east to west. The Himalayan region occupies the northern part of the country along the border with China. The Hilly region ranges up to the altitude of about 3000 meters below the Himalayas and above the Terai in the south. The Terai is totally flat land in the southern part of the country along the border with India. On the basis of political division, there are five regions: eastern, central, western, mid-western and far-western development regions. The capital city, Kathmandu, lies in the central development region. The five schools involved in this study from rural areas across Nepal are introduced individually in Chapter Three.

Nepal's new constitution, 2015 (2072 BS), divided the country into seven states. This has merged thousands of Village Development Committees into counties, municipalities, sub-metropolitan cities and metropolitan cities (Constitutional Assembly Secretariate, 2015). However, the execution of the constitution is still under a process requiring following-up elections to form state and central government. This will subsequently reform existing educational bodies in the country.

About 80% of total population of Nepal still resides in villages in rural areas (Central Bureau of Statistics, 2011; published 2012 November). The 2011 Census reported that the literacy rate had increased from 54.1% in 2001 to 65.7% in 2011. The male literacy rate was 75.1% whereas the female literacy rate was 57.4%. The census report also stated that 23.66% of the population is urban, and that only 3.77% of the rural population had access to computer technology. At the same time, 12.11% of people in urban and 1.24% people in the rural areas owned an internet connection in their houses. This shows the status of computer and internet access is very poor in the countryside of Nepal. However, Nepal Telecommunication reported that about 50.11% of the total population of the country had access to the internet in the early part of 2016 (Pokharel, 2016 August 7; retrieved 2017 September 1). The report

stated that on average about 15,000 new subscribers are added daily. It also stated that over 95% of the total population has telephone access. Nepal Telecom Authority recently reported that over 58.72% of the total population of Nepal have internet access (News24Nepal, 2017 September 1; retrieved 2017 September 11). However, it reported that the majority of people are urban people and mobile data users. The trending graph indicates that there is a rapid growth of technology use in Nepal. The rapid spread of technology is directly or indirectly influencing the lives of people residing in rural contexts. From this increased usage grows Nepal's education policy to integrate digital technology in school education, the *One Laptop Per Child* (OLPC) programme and other private attempts in educational development. The aim is a transformation of the traditional form of classroom teaching and learning.

However, the explored issues in this study are *how* the ICT is used and *why*. These questions directed me to study in-service teachers' ICT practices in rural primary schools in Nepal. The study, therefore, was oriented towards what role the teachers play in classroom teaching and learning activities with the available digital technologies, what student involvement there is in the classroom activities, and whether the existing practices are amplicative or transformative. This study gathered rich information about these issues through observations of the teachers' classes and semi-structured interviews with the participant teachers and through review of Nepal's national educational documents. The socio-cultural approach required the building of rapport with the schools and teachers. A case study approach guided the research. The methods I used in this study enabled me to explore a broad range of information from multiple embedded cases. Thematic qualitative analysis was used to process the qualitative data gathered and led to a report of findings and the formulation of recommendations.

ICT in the International Context

The international availability of ICT devices has rapidly increased in the last decade. Easy access to GPS service, descending tariffs, availability of smartphones and ICT knowledge in the new generation have boosted the growth of data users. ICT has become a need of modern society. When we look into the evolution of classroom technology, the use of digital technology has proliferated throughout the world astonishingly. Donaldson and Knupfer (2002) reported that the overhead projector

was developed in the 1940s, a teaching machine in the 1950s, the mainframe computer in the 1960s, the microcomputer in the1970s, the internet in the 1980s, the worldwide web (www) in the 1990s and new digital capabilities at the beginning of the 21st century. According to Donaldson and Knupfer, effective use of the computer involves understanding its capabilities, applications and systems. In the similar vein, Clark (1994) critically stated that media such as ICT tools can have a significant influence on the cost and speed of learning, but need to be cohesive with instructional methods.

ICT in teaching and learning activities was initially introduced in British schools in the 1980s and British Educational Suppliers Association (BESA) has been monitoring about 26,000 United Kingdom state schools since then (Wesleyan, 2015 December 10; retrieved 2017 October 16). According to online information, the schools in the United Kingdom already had about 2 million computers in 2005, involving 99.9% of secondary schools having internet connections, as well as 80% of primary schools and 99% of secondary schools using an interactive whiteboard for teaching. Colleges and schools are encouraged to move away from traditional classrooms and curriculums in order to prepare students for the future workforce. For this, ICT access is vital. When we look into the statistics of United States of America, about 97% of teachers have at least one computer in their classrooms every day, while 54% of teachers bring their own device to the classroom (National Center for Education Statistics, 2015). The NCES website states that 93% of the computers could be connected to the internet whereas one computer could be shared by five students every day (*ibid*). In New Zealand, the use of the web is rapidly increasing as the Ministry of Education is launching ultrafast broadband to schools (Stats, 2015). Online information indicates that the Ministry of Education, New Zealand has committed to meet the target of 97.7% of schools and 99.9% students having that access by 2016. It is expected to improve wireless and satellite services in most remote schools.

Globally there is some influence of information and communication technology in every aspect of development. Every country in the world has now realised the importance of ICT in various fields of business and education. The studies into how

young people are using ICT in Zambia, South Africa and Vietnam can be examples for other developing countries. According to The Guardian (2013, June 17; retrieved 2015 August 20), UNICEF found from the survey that 40% of children in rural areas of Vietnam used the internet for their school course related activities, of which 34% consisted of text-messages. The study reported usage of 62% and 57% respectively in various urban parts of Vietnam. According to Battista, Dutta, Geiger and Lanvin (2015), *The Global Information Technology Report, 2015* emphasised the role of ICT as a means of social development and transformation by generating access and opportunities for people. Thus ICT influences lifestyle, processes and governing bodies. United Nations Education, Scientific and Cultural Organization (UNESCO, 2015b) stated that:

> Information and Communication Technology (ICT) can contribute to universal access to education, equity in education, the delivery of quality learning and teaching, teachers' professional development and more efficient education management, governance and administration.

UNESCO affirmed that incorporating the role of ICT in teacher education can address these challenges through a systemic approach. The innovation and development of ICT for leisure, social interaction, education and work require children to be competent in using a variety of ICTs. To facilitate this goal, UNESCO aims to ensure all nations can educate their students with the best resources available. Today the governing bodies of many countries throughout the world have adopted UNESCO supported policy to meet UNECCO expectations and to improve their standards of education. In the world of web technology that connects the people from different parts of the world easily, Davis (2001) suggested replacing the word 'National' with 'International' in 'National Grid for Learning' and thinking about a vision of designing ICT educational plans beyond one nation. The global context shows that children are growing up in an environment where social media, mobile technology and virtual communities are basic to their ways of communicating, learning and developing (The Guardian, 2013, June 17; retrieved 2015 August 20). The Guardian claimed that digital technology is observed as a powerful tool to achieve global targets of education, better livelihoods and health.

The Education System in Nepal

The formal structure of education, as shown in Figure 1 below, consists of basic (Grades 1 to 8), high school (Grades 9 to 12) and tertiary education (Bachelors, Master, M.Phil and PhD). Beside this, there is also the provision of Technical School Leaving Certificate (TSLC) and Diploma qualifications. Those who do not complete basic schooling also have non-formal literacy and life-skill programmes available. The Ministry of Education (MoE) governs the education system of Nepal, and provides policy for the management, and implementation of education. The Ministry of Education has three divisions: Planning, General Administration and Educational Administration. The Curriculum Development Centre, Secondary Education Development Centre, Distance Education Centre, Office of the Controller of Examinations, National Centre for Educational Development, Regional Education Directorates and District Education Offices prepare educational programmes and services.

There are acts regulating universities and schools. The Department of Education (DoE) in the Ministry of Education develops and monitors the educational programmes in schools. The DoE implements all the programmes through District Education Offices (DEOs). The DEOs implement programmes and regulate the schools in the districts through School Management Committees (SMCs) in the schools. The Ministry of Education also has separate four central units for Curriculum Development, Teacher Development, Examination, Non-formal Education and Teachers' Records Management.

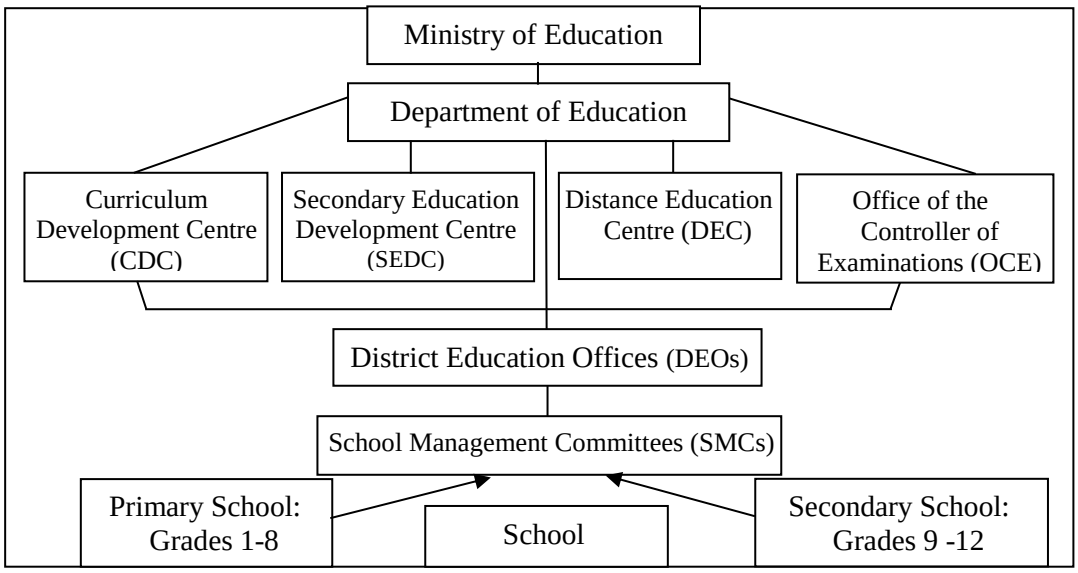

Figure 1.1: Nepal's school education system

Primary School Curriculum

The Curriculum Development Centre (CDC) is responsible for developing curriculum for schools and is one of the central divisions of Department of Education in Ministry of Education. School education has been defined as basic (Grade - 1 to 8) and high school (Grades 9 – 12). The *National Curriculum Framework for School Education, 2005* included ICT for the first time (MoES, 2005). The curriculum tried to address the needs of the 21st century and of globalisation of education (MoES, *ibid*). It suggested that schools use ICT in three ways:

a. as a tool for delivering information and/or services, including school administration;
b. as a tool for teaching other subjects; and
c. as a separate subject.

Although few schools and colleges in Nepal have incorporated ICT in their teaching and learning activities, the role of ICT in preparing a skilled workforce has gradually been given greater importance. The reformed *National Curriculum Framework for School Education, 2007* reiterated the objective but it raised some issues (MoES, 2007):

- The curriculum has not properly addressed ICT.
- The curriculum has not properly defined ICT as a subject or as a tool for teaching and learning.
- There is no bottom-up consistency in the order of technical subjects including computer education.
- There is a lack of adequate physical infrastructure, conducive environment and competent resource persons.

The reformed *National Curriculum Framework for School Education, 2007* pointed out the problem that the curriculum lacks a precise definition of ICT in education, but re-asserted the aim to integrate the knowledge on Information and Communication Technology with other subjects.

The Government of Nepal has already initiated a programme of integrating computer technology in education and installed computer labs in some schools in all 75 districts with the support of various non-government organisations. With the policy of

integrating ICT in education, the Government of Nepal and Open Learning Exchange (OLE) signed a Memorandum of Understanding (MoU) in 2007 to allow the *One Laptop Per Child* (OLPC) programme of Open Learning Exchange to work in rural primary schools in Nepal. Since then, the OLPC programme has been working in several rural primary schools in many districts in Nepal. The project installs computer labs that contain laptops for pupils, a local server with an e-library and other necessary infrastructures. Open Learning Exchange trains teachers on how to use the digital technology in teaching and provides them continuous support.

ICT in the Context of Nepal

Mobile ICT devices have a very short history in Nepal. The computer was introduced in Nepal when the IBM 1410 model was brought for the first time in 1971 for processing the demographic statistics of the 1971 census (Chapagain, 2006). In the same year, the Government of Nepal executed a first telecom project to modernise its telecommunication. The government established the Electronic Data Processing Centre (later renamed as National Computer Centre) in 1974 to promote computer awareness, literacy and application of information technology (IT) (Chapagain, *ibid*). In 1993, there was great news for the country that the Royal Nepal Academy of Science and Technology (RONAST) and Mercantile Office Systems (MOS) introduced internet in Nepal (Shakya, 2007). However, there was a lack of clear policy about ICT development and execution although there was a rapid growth of wired and mobile phone users. Ultimately in 2000, the Government of Nepal brought out the *IT Policy, 2000* (Nepal Telecommunication Authority, 2012 November 22). This policy aimed to alleviate poverty by increasing job opportunities in the country. One of the main provisions of this policy was to bring IT into educational institutions, record government information on a database and disseminate information through websites. It also emphasised distance learning.

The use of internet has rapidly increased in the last decade. According to the record of Nepal Telecommunication (NT), 0.26% of the total population used the internet in 2001. The record of internet users came to be 2.74% in mid-August 2010 and reached 7.93% in the early 2011 (MyRepublica, 2011 April 19; retrieved 2017 September 1). The number of internet subscribers grew rapidly within a year and recorded 19.32% by mid-August 2012 (Ktm2day, 2012 November 14; retrieved 2017 September 1).

The figure reached 25.82% in June 2013 (The Kathmandu Post, 2013 July 31; retrieved 2017 September 1). In mid-October 2013, it was recorded that 27.92% of the population were internet subscribers whereas 83.40% were telephone users (The Kathmandu Post, 2013 December 12; retrieved 2017 September 1). By the mid-December 2014, the record of internet subscribers crossed 38.09% while the telephone users crossed 90% (Ktm2day, 2015 February 20; retrieved 2017 September 1). The growth hiked mainly because of a competitive market of private companies which provide mobile and internet services.

Nepal Telecom recorded that 50.11% of the total population of Nepal had internet access and that 15,000, on average, new subscribers were connected to this service every day in early 2016 (Pokharel, 2016 August 7; retrieved 2017 September 1). Within one year in August 2017, Nepal Telecommunications Authority reported that the number of internet users crossed 58.72% of the total population of Nepal (News24Nepal, 2017 September 1; retrieved 2017 September 11). The majority of them (95.97%) would surf the internet on their mobile devices. This shows that although the number of internet users is increasing immensely every day, it is costly to use the internet in educational activities. However, Nepal Telecommunications Authority claims that the extension of optical fibre in all parts of the country will avail high-speed internet in rural areas in the near future.

Although the development and spread of ICT in educational practices is at a beginning stage in the context of Nepal, technology use in the classroom is rapidly increasing. Open Learning Exchange (OLE) Nepal as a social organisation was established in 2007 with the aim of increasing access to quality education through the integration of digital technology (OLE, 2017 September 1). The OLE initiated ICT in teaching-learning processes in Nepali government schools in rural areas. The OLE Nepal signed an agreement with the Government of Nepal to execute the *One Laptop Per Child* pilot project in two schools around Kathmandu, the capital city of Nepal in 2008 (OLE, *ibid*). Initially starting from two schools, currently OLE Nepal has been running its ICT in education programme in 225 schools in 34 districts with the belief that low-priced computers are a cost-effective medium for promoting access to education for Nepali pupils (*ibid*). The OLE has been working in partnership with the Department of Education (DoE) under the Government of Nepal with the support of

the Danish Government's Local Authority, United Nations World Food Programme (WFP) and the Finnish Government's Fund for Local Cooperation. The OLE claims that the organisation trained over 700 primary teachers on how to incorporate technology into classroom teaching and learning activities, prepared 630 interactive learning modules, deployed 5300 laptops and benefitted over 42,000 students from 225 schools. The organisation has prepared extensive digital materials based on school curriculum and installed a digital library in servers in each school where the project has been working. The OLE has introduced digital technology to the teachers and students with the following principles:

- Development and distribution of free and open digital educational content
- Preparing teachers on effective integration of ICT in classroom teaching
- Research and development of appropriate technology and network infrastructure
- Capacity development

In addition, there are some other NGOs and INGOs or local communities working to integrate ICT in school classrooms. However, UNESCO (2014) reported that only 6% primary schools and 24% high schools in Nepal are connected to electricity and that makes a difference in the use of ICT in school education. The statistics shows that the proportion of primary schools with computer-assisted instruction is less than 0.5%, and that the learner to computer ratio is about 500 pupils per computer (500:1). However, the recent record of internet and mobile users in Nepal indicates that the accessibility of computer technology has rapidly increased in the past few years.

ICT in Nepal's National Education Policy

Donaldson and Knupfer (2002, p. 35) argued that there are issues regarding "knowledge, power, control, access and equity" that should be revolutionised before thinking about a smooth technological environment for learning. There may be a shortage of resources and training in the schools. In this situation, there must be means for sharing those available resources. A digital distribution of resources can support teaching and learning activities of teachers and students if they have access to technology (Donaldson & Knupfer, *ibid*). Bjerede, Atkins and Dede (2010) argued that, realising the need of society, governments should make policy to *unwire* schools through a mobile broadband internet for teachers and students so that the teaching and

learning would take place wherever they are. They claimed that the establishment of an open and cost-free facility of mobile broadband services for teachers and students would be a positive step. They advocated the value of a ground where all stakeholders (teachers, students, parents, local authorities and governing body) can be interconnected with wireless mobile broadband.

The recent trend of ICT use shows that its application is rapidly spreading throughout Nepal. Its influence can be observed in the educational sector in how the schools and colleges are using different forms of ICT. ICT integration is more popular in private institutions than in community schools and colleges. Perhaps investment as a business motive is one of the significant factors that has transformed private schools to modern learning environments breaking away from a traditional form of schooling. However, the Government of Nepal claims to be trying to transform traditional classrooms in community schools into ones with a technological environment. The Government of Nepal allocated a large budget about Rs 86.03 billion (eighty-six billion three million Nepali rupees, which is about 846 million USD) for education for the fiscal year 2014-15 which is about 13% of the annual budget (MoF, 2014 July 13). For the year 2015-16, the Government of Nepal allocated Rs 98.64 billion for the education sector (MoF, 2015 July 14). Unfortunately, the April 2015 earthquake compelled the Government of Nepal to spend more in reconstruction of habitats for disaster victims and other destroyed infrastructures. As a result, the government allocated Rs 26.25 billion for school sector development (MoF, 2016 May 28). However, this year's budget has allocated only Rs 66.12 billion for education-related programmes (MoF, 2017 May 29).

A four-day workshop for preparation of a master plan was organised in Kathmandu in 2010 with the support of UNESCO as a first formal attempt to integrate ICT in education (MoE, 2013). After the Government of Nepal had prepared *IT Policy, 2010*, *School Sector Reform Programme, 2009-2015* and *Three-year Plan, 2011-2013* as a foundation to implement *ICT in Education* on 25th November 2013, the government passed the final version of the *ICT in Education Master Plan, 2013* (MoE, 2013, p. 8). The plan proposed to promote ICT use in education, increase access and assure the quality of education for all. The policy focuses on "ICT infrastructure including internet connectivity, human resources, content development and system

enhancement". Likewise, sub-sections of the plan include: school Education, Higher Education, Teacher Education and Training, and Continuing Education and Lifelong Learning, and Governance and Management in Education.

The *Master Plan, 2013-2017 on ICT in Education* (MoE, 2013, p. 10) emphasised the need for ICT integration into school and higher education, teacher training and vocational education. Nevertheless, the plan does not define ICT clearly, as it says:

> Computer science has been taught as an optional subject in school (grades 9 to 12). Different colleges run Computer Engineering/Computer Science/ ICT programme in Bachelors and Masters Levels under various universities. Various Training Institutes conduct technical education and vocational training courses in computer and ICT. Tribhuvan University has started Bachelors in Education program in computer science.

On the other hand, one of the principles in the plan proposes that "ICT in education as a teaching and learning tool would encourage the utilisation of all potential media and technology" (p.12). The master plan aims to decrease the gap of digital divide by developing ICT infrastructures, skilled workforce, digital content and an appropriate education system.

Purpose of the Study and Research Questions

The purpose of this study is to examine the extent to which Nepal's policy aspirations concerning ICT in education are realised in rural primary schools.

The fast growth and development of technology throughout the world seem to ensure that ICT will dominate in classrooms globally. Transformation of teaching and learning focuses on bringing changes in teaching mechanisms and developing learning strategies. The application of ICT in education has shifted a teacher's role to a facilitator rather than an instructor. E-learning, or a virtual learning environment, has created a shared working space and resources, easy access to recent information, promotion of collaborative learning, and developed different strategies for teaching and learning. Promotion of the internet has attracted the current generation of learners towards an online blackboard where they can have live interaction while sitting at various locations around the world. Learners can share ideas via audio-video chat or live chat. The global trend in the use of ICT forecasts that ICT will be an indispensable part of daily life. As ICT is introduced in education along with

changing technology, the question of '*how*', *why* and '*when*' to employ ICT in the classroom should be considered. These values might have encouraged educationists, curriculum developers, teachers and other professionals who are involved in the field of education to design and remodel teaching methods and strategies according to the need of society. These global trends and aspirations have also influenced the development of policy in Nepal. However, there are significantly different conditions in the context of Nepal and that of the western countries where the use of ICT in education is established. The differences are even more pronounced in Nepal's rural areas.

My research questions address these differences as well as investigating the practice of rural primary schools.

The overarching question that guides this research is:

> **How do primary in-service teachers integrate ICT into their teaching and learning practices and activities?**

This gives rise to a number of sub-questions:

1. In what ways do in-service teachers use ICT in planning for their classroom teaching and in their delivery practice?
2. How are they supported by their training and by on-going professional development?
3. What resources are available to them?
4. What roles are played by the government and by NGOs?
5. How has the April 2015 earthquake in Nepal impacted on the use of ICT in schools?

Organisation of the Thesis Chapters

Chapter One provided the background of the study. This chapter has indicated differences in expectations and opportunities for use of ICT usage in international contexts and Nepal's context. Also, the chapter has offered an overview of the school education system in Nepal and of how ICT has been introduced into the primary school curriculum. From this basis it states the purpose of the study and research questions.

Chapter Two offers a literature review. The literature review is presented in three sections: relevant to Nepal, developing countries and developed western countries respectively. It identifies that while there are some writings about ICT in education in Nepal there are few studies about its use in rural schools. In reviewing studies from other developing countries, it identifies cautions as well as advocacy of the integration of ICT into teaching. The concerns and teaching strategies described in studies from developed western countries relate to conditions very different from those in Nepal, and so have limited immediate relevance to my study but are significant because they raise issues that will need to be considered as Nepal progresses its development of ICT in education. The last section of this chapter reports studies of how non-governmental organisations are involved in Nepal's education. This chapter provides a theoretical framework for this study.

Chapter Three recounts the complexities involved in entering the field of this research project. It offers this account not only for its own sake but also as a way of enabling readers to better understand the context in which the research took place and how it differs from contexts with which they may be more familiar. It recounts how the research project was developed, what difficulties were encountered in approaching potential gatekeepers, and how the original plan needed to be modified due to the 2015 earthquake and the problems experienced in the field. It recounts the difficulties presented by geography, language and cultural differences and describes the difficulties in communication and obtaining information.

Chapter Four explains the methodological approach and design of the study. It explains the multiple sources of information utilised and reported: specifically, the use of policy and other official documents and the fieldwork with rural schools. It describes contexts of the schools involved in the study and lists the participants. It describes the process of gathering participants' experiences and perceptions about ICT use in instructional activities, and explains the process of thematic analysis.

Chapter Five reports and discusses Nepal's education policy in ICT and teachers' understandings of it. It discusses why and how the Government of Nepal tries to integrate ICT in education, provides an overview of the processes of teacher

appointments and the varying levels of qualification and salary levels, explains the role of NGOs in the provision of ICT infrastructures and training, and the development of curriculum. It explains the decentralisation of school management systems. The chapter provides a contextual background for exploration of challenges in the execution of ICT in education policy and highlights the role played, or not played, by government authorities in the implementation of the policy.

Chapter Six discusses participants' experiences of ICT training, pre-service teacher training courses, government provided teacher professional development programmes, and the role of NGOs in ICT training. It highlights teachers' perceptions of the ICT support they received and in particular examines how well they felt they were prepared to use modern educational technologies in their instructional activities.

Resources and available infrastructure of ICT are examined in Chapter Seven. This chapter describes the digital technology and digital content provided by NGOs and discusses how the technology is used in teaching and learning in rural primary schools. This chapter also discusses how teachers, without internet connection in the lab, use the digital resources that have been loaded on to their devices and the e-library available in a local server in their instructional activities.

Chapter Eight reports and discusses teachers' teaching approaches with digital technology. This chapter examines how the teachers manage classroom resources, and how they are constrained by existing infrastructures. It further examines how the teachers adapt their teaching styles to incorporate both textbook and digital resources and to what extent they encourage student independence in the digital lab. It also examines teachers' perceptions of student engagement in leaning through the use of digital technology.

Chapter Nine reports the impact of the 2015 earthquakes on teachers' lives and practice of ICT in schools. It examines post-disaster impacts on people's daily life, on children's mental aspects and schools' infrastructures. The chapter reports how local, national and international efforts supported schools to rebuild. Why one of the schools which lost whole technology in the earthquake could not revive the technology is also

discussed in this chapter. Although the major April earthquake was an unforeseen disaster at the time this study was planned, earthquakes are recurring events in Nepal, and the rural sector is particularly vulnerable. Therefore, consideration of the impact of earthquakes is an important element in examining implementation of ICT in education in the rural sector.

Finally, Chapter Ten sums up the key issues that arise from this research and their implications. It identifies the new knowledge that is contributed by the study. It makes several recommendations for the policy, practice and future studies.

Chapter II: Literature Review

Introduction

This chapter reviews literature about ICT policy, pedagogy, infrastructure and the place of development-based non-governmental organisations in education. When reviewing relevant literature for this study, I realised that the use of ICT in pedagogy is an under-researched area in the context of rural Nepal and there is relatively little published research. A review of the available Nepali literature follows immediately, and then I turn to international research and theorisation. In reviewing the international literature, I first review studies of the expectations of how the use of ICT can transform learning, then I examine studies that discuss the content of ICT-based teaching and aspects of student engagement, then I survey studies that address teachers' professional development in ICT, on-line learning communities and other supports for ICT implementation. Finally, I review studies of the role played by NGOs in Nepal, particularly in the field of education.

ICT in the Curriculum of Nepal and Teacher Training on ICT Use

The *ICT in Education Master Plan, 2013-2017* in Nepal has identified the major infrastructures, such as availability of the internet, skilled workforce, content development and system enhancement, that it considers as fundamental components to be considered while making policy on ICT in education (MoE, 2013). Dawadi and Shakya's (2016) study in cybers, tele-centres and libraries in rural Nepal reported that the rapid development of ICT and extension of infrastructure in rural Nepal has increased the possibility of e-learning and the internet has enabled school teachers to access the latest online information and that this facilitates rural school students' education. However, the *School Sector Development Plan, 2016 -23* states that funding for equipping primary schools with ICT infrastructure (MoE, 2016) is not available. Furthermore *ICT Policy, 2015* explicitly states that the Government of Nepal intends to create a public and private partnership to provide ICT infrastructure in government schools (MoIC, 2015).There is a clear tension here between the aspirations and rhetoric of policy and the practicalities of funding and resources.

My research sets out to investigate what strategic plans for the execution of the policy to produce ICT skilled teachers have been developed by the Government of Nepal and

how those plans are, or are not, translated into practice. Dhakal and Pant (2015) pointed out that ICT in education courses in teacher education at the universities in Nepal are oriented to develop computer programmes rather than facilitate the general use of ICT in teaching various subjects. Smith (2009) stated that, although Schools of Education in the institutions are responsible for improving the quality of initial teacher training (ITT) and equipping prospective teachers with appropriate practice, teacher education programme in Nepal do not cover ICT education and overall seem to be fragile.

Dixit (2009) reported how radio, an ICT tool, was integrated into teacher training in 1980 for the first time and was continued in all training programmes in Nepal. Dixit stated that later in 1993 the government policy on the ten-month primary teacher training programme allocated two and half months for radio training. After a long time, the *National Curriculum Framework for School Education, 2005* included "ICT as a proven tool for educational transformation" to be used in instructional activities in schools (MoES, 2005) and the *National Curriculum Framework for School Education, 2007* reiterated the objective (MoES, 2007). Shields (2011) argued that, although the integration of ICT is constituted to meet the national education goal of public service and quality education, the terms *proven* and *transformation* in the curriculum are vague. He argues that there is no empirical evidence to prove whether over a thousand private ICT training centres in the country provide training at the expected standard, or if they yield economic returns.

The National Centre for Education Development (NCED), the government teacher training agency, provides generic training but does not include ICT in its training programmes. Bhatta (2008) argued that the generic teacher training module should be redesigned on the basis of ICT implementation, which would enable teachers to stay up to date with improving practices in their teaching. He asserted that teachers' technological knowledge helps them overcome their fear of the computer, but the challenge lies in how they can integrate these technologies to access digital contents while teaching. He emphasised that teachers in those Nepali schools where the children have individual devices in the lab need to have a basic knowledge of teaching strategies and techniques related to child-oriented interactive education.

Most of these studies and arguments are based on a national perspective. Only and Bhatta (2008), Shields (2011) and Dawadi and Shakya (2016) have addressed a rural context. This identifies a gap that requires further study.

Teachers' Participation in Online Learning Communities (OLC)

International researchers, such as Seo and Han (2013) in Korea and Wang and Yang (2014) in China, have discussed the value of websites in providing opportunities for collegial communication. Internet World Stats (2017) reported that in Nepal about 6.4 million people, (21.9% of the total population) were active Facebook users in early 2017. The Nepal Telecommunication Authority reported 50.11% of the entire population had been connected to the internet and over fifteen thousand new people subscribed to the internet in Nepal daily (Pokharel, 2016 August 7; retrieved 2017 September 1). The number of internet users crossed 58.72% of the total population of Nepal in the mid-2017 (News24Nepal, 2017 September 1; retrieved 2017 September 11). However, although several closed group pages on Facebook can be currently found, there is little empirical evidence of whether or not the school teachers in rural areas in Nepal participate in online communities and share their problems and ideas.

Access to Online Information for Self-Directed Learning

There are some organisations in Nepal which support schools, students and teachers with digital resources, distance learning materials and distance support for learning. For example, Open Learning Exchange (OLE), an NGO, which has been working with the Ministry of Education and has provided an open access base for all to e-library and digital resources for primary level courses on their website (MyRepublica, 2017, March 15; retrieved 2017 August 18). Padhnajane (2017 April 26; retrieved 2017 August 18), explained that their project, after the major earthquake in April 2015, has launched a distance learning course based on MOOC (massive open online course), reaching to a number of schools in ten different cities in Nepal and many teachers and students have successfully completed online courses. The official website of Scientology (2017 August 18) states that Applied Scholastics Training Centre in Nepal has built a network of over 1600 technology teachers expecting the change in their schools and surrounding areas.

Pangeni (2016) contended that the rapid growth of internet facility in Nepal has provided the current generation of learners with options of doing foreign university courses from Nepal and accessing the massive online open courses of several local and international training institutes from their home. A study by Shields (2011) revealed that private computer institutes even in small towns in Nepal have developed some level of ICT literacy and computer skills. Bhatta (2008) identified that teachers in rural primary schools needed to develop computer literacy to rid them completely of fear of computers. However, Thapa and Saebo (2011) reported that the teachers and students in rural schools in Nepal would often stay at school until midnight in the beginning days, and they gradually cultivated their interest to work on computers.

The above information obtained from organisational websites and newspapers indicates how online resources for educational purposes in Nepal are oriented towards urban areas where there is internet access. Although the online resources are accessible and open for all, the data I collected suggests that the means to utilise such resources in remote rural villages where there is no infrastructure currently seems beyond imagination.

Language for Accessing ICT

From their study in the multilingual and multicultural context in Nepal, Thapa and Saebo (2011) emphasised that the choice of language for accessing localised contents and for developing digital content is a significant factor: technology does not have value unless people can understand the language of the start-up. Similar to the multilingual context of Nepal, some studies (Ashraf, Hanisch & Swatman, 2009; Islam, 2010; Khan, Hossain, Hasan & Clement, 2012) in Bangladesh found language, one of the major barriers to use ICT in the classroom teaching effectively as Bangla in Bangladesh is the commonly spoken language, but the English language is dominant on computer software.

There are more than 6,500 languages in the world (Infoplease, 2017 September 3) but it is estimated English as the dominant language of the internet covers about 80% of online contents (Tinio, 2003, p. 24). Ivins (2011) studied the rural context of Nepal and also found that the issue of language was one of the biggest challenges of imparting information and services to stakeholders. Warschauer and Matuchniak (2010) found that English language was one of the main barriers for Latinos in the

United States to access the internet. They also discovered that 70.3% families with under-18 children had subscribed to home internet as compared with 57.4% families without children, indicating a desire to provide their children with opportunity to learn through the internet.

Although there have not yet been empirical studies about linguistic barriers to the introduction of ICT in rural schools' teaching activities in Nepal, these international studies signal that language is a major factor in educational planning and ICT integration in education.

Rural Context, ICT and Affordability

The rapid spread of using emerging information technologies is gradually linking the remote and rural areas to urban ones. However, it is not an easy task to equip the rural schools with ICT. Small districts and communities are likely to have a limited budget to install modern technologies in the schools, lack of information about educational grants and significant opportunities (Basye, 2014 July 15). For example, Thapa and Saebo (2011) found that lack of high-quality internet, electricity and supporting infrastructure are major challenges in Nepal's rural schools. Dawadi and Shakya (2016) also reported some major challenges for implementing ICT in education, such as lack of skilled workforce, unreliable and costly internet facility, low level of ICT literacy in rural communities, high hills and mountains, lack of hydropower in the countryside and low power solar energy and lack of security for ICT infrastructure in Nepal.

Ruthven, Hennessy and Brindley (2005) stated that even in developed countries rapid technological innovations and development have brought threats because it is almost impossible to keep pace with the new technology system that arrives at the next sunrise, and may be very costly to adopt. In the context of rural Nepal, it seems a much greater challenge to build infrastructures. For example, Nepal Wireless Network Project, which uses ICT in various sectors such as health, education and micro-level business in rural communities in a mountainous district in Nepal, has potentially improved education and socioeconomic aspects of rural communities, but it is very costly for the people who cannot afford expensive digital technologies (Thapa, 2011). Recent records of internet users, as mentioned above, indicate that people's capacity to afford internet has increased in wider Nepal. However, the per capita income of

about US$730 (Sharma, 2017 May 24; retrieved 2017 September 3) of Nepal shows that the poor economic status of many individuals may be a barrier to afford expensive digital technology.

Old computers and limited numbers of computers create a range of problems in educational practices and generate an interrogation of the efficiency of teachers and teaching strategies (Konstantinos, Andreas & Karakiza, 2013). However, Bates (2000, p. 15) argued that intelligent practice of emergent technology in education generates opportunities for educational institutions in a more cost-effective way than traditional strategies. Krumsvik's (2005) study in Norwegian high schools found that the teachers purchased a personal computer, subscribed to the internet at the early stage, accessed resources at schools and home, and the teachers were able to develop ICT competence. However, developing countries like Nepal are probably not able to invest extensively in ICT in education (World Bank, 2015). The World Bank report suggests the developing countries have public-private partnerships and user fees for adopting technology in education.

Rennie and Mason (2007) reported that, although there is rapid growth of the number of mobile phones, Nepal is still at the beginning of ICT application even in higher education. They also argued that the rapid growth in the use of mobile technology would be an opportunity for transforming rhetoric teaching to modern ways of delivering content. Nevertheless, the *School Sector Development Plan, 2016-23* stated that the schools which do have ICT infrastructure were found to be using ICT tools for administrative purposes (MoE, 2016). It emphasised that ICT needs to be used appropriately 'to improve classroom delivery, increase access to learning materials and improve educational governance'. The intervention of Mainali and Heck (2017) with a laptop and projector in a community high school in Nepal to teach geometrical problems and the provision of the individual desktop computer in a hired private computer training centre for each student at the end of teaching a body of content gave a much better result than teaching without the technology. They stated that although there is limited or no facility in Nepal's community schools, the use of the limited facility in teaching can improve students' learning.

These writings emphasise the complexity of the situation in introducing and resourcing ICT into teaching in rural Nepal.

ICT Leading Pedagogic Change in Developing Countries

As there are limited studies in the field of my study in Nepal, it important to review literature from somewhat similar contexts. This section presents how various researchers have examined the introduction of ICT into classrooms in rural contexts in developing countries, the resulting practices, the benefits and the challenges.

Bringing ICT into Existing Classroom Paradigm

It is likely that several communities in Nepal have schools similar to the Syrian schools in Albirini's (2006) study which suggested a struggle with insufficient computer resources and incompetent teachers. Albirini found that normally a teacher had once-a-month access to the computers, and suggested that other social indicators such as economic factors, school context, language and local culture should be addressed before implementation of technology in education. He suggested policy-makers should think and plan by addressing the positive attitude of teachers and allow the teachers to experiment with new technologies into their pedagogies. However, he argued that lacking technological resources is not the biggest problem in the implementation of educational technology in schools, but rather the concrete problems in ICT application are a lack of proper planning, teacher training, computer programmes, knowledge and skills to employ ICT in teaching and learning, and digital content. Similarly, González-Lloret and Ortega (2014) stated that teachers in many underprivileged areas who prepare their plans that call for high-speed internet and computers may be wasting their invaluable time in settings where students only have access to old model computers with untrustworthy connections. Krumsvik (2005) argued that just enough technology and infrastructure cannot create a learning community, but it could provide resources for the teachers and learners.

Teachers in rural contexts may have very limited access to a computer. Arora's (2007) study in Indian rural schools suggested the value of building a sustainable partnership with non-governmental (NGOs) and international non-governmental organisations (INGOs) to achieve access to ICT in educational practice. However, Ligorio (2008) noted that schools are continuously struggling to use new digital technologies which are already familiar to the students, and further noted that schools cannot ignore the existence of the technologies.

Developing nations, including low-economic countries like Nepal, where the majority of people are struggling to survive, face a challenge to find funding for expensive computer technologies. Collins and Halverson (2009, p. 38) argued that, if the schools are adopting computers as the central means for conducting teaching and learning activities, the students would have to do most of their classwork and homework in a networked computer environment. They further argued that it would cost an enormous amount of investment to provide an individual computer for every student, and the school would need to make a considerable investment in computers, software, maintenance and technical staff to maintain the technologies.

The study in Peru of Maldonado, Khan, Moon and Rho (2011) concluded that student behaviour towards the use of technology depends on the authorities, that is on teachers and parents who have to make them aware of technology, because making necessary resources available does not guarantee the implementation of e-learning doorways. Albirini's (2006) study in Syria supported the view that the teachers using computers in their teaching were able to save time and effort, increase students' learning and create a better learning environment in the school. In the context of Turkey, Bosnia and Herzegovina, Demirli (2013) discovered that pre-service teachers' ICT learning and teaching became more purposeful as they increased their knowledge of the internet, their attitude to it and their time using it.

These studies emphasise that the use of ICT in classroom teaching can gradually shift traditional teaching and learning strategies. However, they also stress the importance of skilful teachers, infrastructure and continuous support for teachers' practice.

ICT, Classroom Structure and Class Size

Konstantinos et al. (2013) stated that a large number of students in a classroom negatively affect the implementation of innovative teaching approaches and ICT devices. Similarly, Ale, Loh and Chib (2017) found that in rural schools in India, where there was, on average, one teacher to fifty students, it seemed to be almost impossible to reach every student in the class and, on average, four children shared one device in class. They reported that the teachers teaching a large number of students with limited number of digital devices expressed their frustration. Likewise, Collins and Halverson (2009) argued that traditional classrooms do not have sufficient

space for enough desktop computers and that the resources needed to redesign spaces are already scarce. Salleh and Laxman's (2014) research in Brunei high schools discovered that the classroom structure was one of the major factors that influenced teachers' teaching, and argued that it needed to be user-friendly for teaching and learning with ICT. A similar study in Saudi Arabia by Albugarni and Ahmed (2015) reported that many schools were based in rented buildings, which had been built for housing, and they struggled to accommodate ICT infrastructure in the rooms and conduct teaching activities effectively. Therefore, the researchers suggested that a proper plan for school infrastructure, teacher training, ICT access and adequate support for maintaining the technology is essential for the successful use of ICT in teaching activities. Slay, Siebörger and Hodgkinson-Williams's (2008) study in South African schools suggested that in an under-resourced classroom, a single computer connected with interactive whiteboard would enhance teaching and learning although the learners would not have individual access to computers. Interactive whiteboards are not provided in rural Nepali schools.

In addition to classroom structure and class size, a study in Bangladesh reported that the majority of rural schools did not have electricity, even if the computers were provided for use in teaching activities and even the urban areas daily suffered from at least eight hour power cuts and unreliable supply of electricity (Khan et al., 2012). The study raised a question of whether the Government of Bangladesh should invest a huge amount in ICT infrastructure in schools where many people live below the international poverty line. Demiraslan and Usluel's (2008) study in Turkey revealed that even in schools equipped with ICT, and excluding the majority of primary schools which lacked digital technologies, students had limited opportunities to access computers and the internet was slow, and so they had to rely on teachers' delivery of lessons which reduced their motivation to be involved.

The majority of these studies emphasised that it is very costly to redesign the existing infrastructure and install sufficient computer devices in rural schools and that traditional infrastructure and large class size impact negatively on the use of ICT in teaching activities. Some studies questioned whether governments in developing countries would be able to invest in ICT infrastructure.

Internet Access, Benefits and Challenges

A number of studies in developed countries have emphasised the need of internet for effective use of computer technologies in instructional activities. For instance, Armstrong (2014) contended that a classroom with the most advanced technology but without powerful bandwidth (internet) to support the available technologies is insignificant. Selinger (2001) stated that the internet can link the school culture with the culture of the students' community, and beyond. Bjerede et al. (2010) affirmed that the internet, in the form of email, blogs and web pages has made possible offline sharing of experiences, feelings, ideas and issues with colleagues beyond the classroom and outside time frames. They argued that when the potential of the digital curriculum is recognised, the students will have personalised access to the digital resources at their own pace and style of learning without the restriction of time.

However, developing countries, where the governments are still encouraging student enrolment and literacy programmes, often need to rely on basic resources and traditional teaching systems and struggle to adapt new technologies in classroom teaching. For example, Tezci (2011) found that Turkish primary school teachers experienced frustration because of limited access to computers and the internet. Hawkins (2002) reported that schools in developing countries either do not have internet facility or the facility is unreliable. He suggested that many developing countries need to develop a strict policy for telecommunication companies to decentralise services into rural areas instead of allowing them just to stay in urban areas, which will open up opportunities for rural schools to use new technologies in educational activities. However, Braun (2010) argued that levels of education, income or lack of resources prevent the underprivileged communities in developing countries to access ICTs and their benefits. Correa and Pavez (2016) concluded from their study in Chile that low levels of education, poverty and limited social networks in geographically isolated remote communities were decisive in limiting access to modern information and communication technologies.

Some studies, such as Wells (2001) and Zlamanski and Ciccarelli (2012), reported internet security issues such as risks of open access information, cyber-bullying and online vulnerable videos, and therefore suggested that parents, staff and students should sign an agreement to allow protection of pupils' psychological, social and

health interests. A World Youth Report (2003; retrieved 2017 September 2) criticised media, including the internet, for causing various social problems such as teenage pregnancy, venereal disease, child trafficking and prostitution, and accused schools of failing to provide young people with the adaptable skills to survive and grow in the technology world, particularly in low-income countries. A case from Rwanda's schools is an example where students were not allowed to freely use computer labs with internet access because of fear of vulgar videos the students would be exposed to (Rubagiza, Were & Sutherland, 2011). Even in developed societies Armstrong (2014) suggested that the students must be taught how to steer the search engines on the vast online world to explore the credible sources of information that they need.

These writings highlight how provision of internet services in rural areas is limited by the topography of remote areas, low levels of income and education. Some of the studies also highlight the challenge involved in keeping children safe from cyber abuse in the rural communities where the people have a low level of ICT literacy.

Teachers' ICT Competence

Moursund (2005) contended that a good teacher needs to have a certain level of expertise in the area he or she teaches and of strategies of teaching. He suggested that teachers learn about ICT, because it is a powerful agent to transform the existing education system, and carefully bring it in their teaching environment so that it supports learning. However, many studies in developing countries have reported that teachers face several challenges in including ICT in their teaching activities, including knowledge and skills of ICT. For example, Adetimirin (2012) found that undergraduates in Nigerian universities faced challenges in achieving the cognitive and technical skills of ICT: limited access to ICT, absence of skills to use available digital technologies, power cuts, inadequate time for using ICT and technical problems with computers.

Abuhmaid (2011) emphasised that different social backgrounds, schools' cultures and the available support for the teachers impact on the effectiveness of ICT training and implementation of skills. Mndzebele's (2013) study in primary and secondary schools in Swaziland in Africa contended that in-service teachers were not capable of using technologies in the classroom due to lack of previous knowledge and skills. Salehi and Salehi's (2012) study in Iranian high schools found that teachers were aware of

digital technologies, but they had inadequate technical support, little access to internet and ICT for their programme development and for the development of ICT skills. Similarly, research by Albugarni and Ahmed (2015) in Saudi secondary schools found that, although the teachers provided their own devices, about 90% of teachers suffered because of lack of sufficient training, resources, technical support and maintenance of equipment.

These studies have resonances with the context of my study because they focus on providing sufficient support for teachers, such as professional development training, maximum access to ICT and technical assistance.

ICT Leading School Change in International Literature

When I turn to international literature about ICT leading school change, there seems to be less immediate relevance as the contexts and the resources are so different. It is, nevertheless, important to review international literature because international studies of how the practice of ICT in developed countries can lead to transformation of traditional pedagogy into modern strategies of teaching and learning provides an exterior platform from which to examine the potential for the use of ICT in education, if resources allowed. That literature also offers a contrast to what is currently possible in rural Nepal, delineating not only differences but also the challenges that face Nepal if it intends to turn the rhetoric of policy statements into practice.

Leidner (2010) stated that information and communication technology has made the world a global village where people are globally interconnected, ideas are shared, and cultures are eventually adopted. However, poverty in developing countries does appear to block active participation in that global village. Spring (2015) explained that although nations regulate their education systems independently, they cannot stay without being influenced by global education process in the world where multinational corporations work through INGOs and NGOs and ICT is rapidly expanding a library of world knowledges. On the other hand, Pulkkinen (2007) argued that although most of the developing and underdeveloped nations have acknowledged ICT in their education policy, the world is still divided into two factions: having access and without access to ICT. Therefore, he considered that providing equal access to ICT and education remains a challenge, and the possibility of ICT implementation and access depends on context. As many researchers such as Hancock

and Algozzine (2017), Stake (2006) and Yin (1981) emphasised, context is vital for any study, and the context of this thesis marks significant differences from that of most studies in this international section.

International Definitions of ICT in Education

Information and communication technology (ICT) encompasses those technologies, which are used to operate telecommunications, broadcast media, building surveillance systems, audio-visual and transmission systems, wired/wireless networking and monitoring systems (Janssen, 2013). Janssen specifically defined ICT as the merger of audio-visual, telephone and computer networks. Gradually ICT is changing our industrial society to an information society (Voogt, 2009). Moursund (2005) stated that ICT provides an opportunity of creating a lively environment in teaching and learning activities although it tends to be an additional burden on classroom management. He explained that a teacher can design such a classroom with ICT where students can communicate with their friends, parents and others. Many researchers (Kalogiannakis, 2010; Olelewe & Amaka, 2011) have argued that ICT embodies interest, challenge and educational inspiration which are keys to open, understand and become involved in this competitive and uncertain world. However, Freedman (2001 June 12; retrieved 2017 September 2) in *The Guardian* said:

> As the technology in schools becomes more sophisticated, it becomes easier to use and harder to understand. So it's vital for schools to have access to someone who can sort problems out, and fast. But the role of the teacher in raising standards in and through ICT remains the same: to ask the right questions at the right time and move pupils in a new direction, to a higher level of understanding.

For a dynamic teacher with resources, ICT integrates a vast source of information and pedagogical implications as those technologies provide digital learning classrooms uniting them in different parts of the world (World Youth Report, 2003; retrieved 2017 September 2). Similarly, Rahman and Panda (2012) argued that appropriate use of technologies can increase accessibility, improve quality and save investment.

ICT can be a fundamental teaching tool that generates a virtual platform for discussion on various issues and barriers. Although the computer, as an ICT device, traditionally was confined to mathematical calculation and manipulation (Komis &

Jimoyiannis, 2007), it has increased the capability of various systems to measure the educational activities and progression by recording daily or regular basis information and teaching activities of the classroom (Nordkvelle & Olson, 2005). ICT can be a powerful tool to visualise complex things in a lively manner, manipulate and deliver information through texts, pictures or graphs but not to teach skills in isolation (Higgins, 2003). Somekh (2007) emphasised that the internet facilitates an urgent need for necessary change in schooling as it provides students access to wide range of materials and online support that makes them much more responsive to their lessons. Williams (2001, p. 49) said:

> If every school across the world learns to use the internet to link pupils of all ages, races, cultures and religions, so that they can respect and celebrate the rich diversity of other people's lives, then my belief is that each project, each email message, each image, each music file, each database file, each videoconference, each shared website, is contributing something, however small and seemingly insignificant in itself, to that larger goal of world peace.

She argued that, although the internet is criticised as the source of vulnerable videos and hatred, it is an effective tool to create a community for establishing relationships and for linking different cultures. Bates (2000) argued that the World Wide Web (www) and the more advanced system web 2.0, which allows us to have video-conferencing, makes learning easier and provides teachers with space to create lectures and present lively materials in the classroom which can be made available off-school and on-site for teachers and students. ICT thus allows creation of a simulation of real environment to help learners communicate their experiences (Selinger, 2001). The digital platform also benefits education researchers as it allows them to share and evaluate their innovations. Nepali policy about ICT is influenced by these kinds of aspirations but there is yet not any cohesive plan to make them achievable.

ICT Integration in Teaching and Learning

The following sections review international literature that discusses various dimensions of what it means to integrate ICT into teaching and learning. Some of these will be returned to in Chapter VIII.

The word *integration* has been a common term when talking about technology in teaching and learning. However, Eady and Lockyer (2013) argued that the concept of technology integration in the curriculum tends to describe *how to use* the technology in teaching but not how the students apply their knowledge and skills of technology. Eady and Lockye suggested teachers use various forms of ICT such as digital resources, multimedia, various web application to present information, to link the students with the context outside and inside the school, and to engage the students in learning activities. Selwyn (2012) suggested considering *structure and process* while integrating ICT into the school. *Structure* refers to a social and cultural composition, and *process* refers to socialisation, regulation and control. The international literature indicates that various forms of ICT have been used mainly for three purposes: to present content, engage learners in learning activities and communicate information within the classroom and with outside world. However, a number of studies have reported both strengths and challenges of using digital technologies in teaching and learning.

Presentation of Content

Protopsaltis, Goodwyn and Fuller (2009) stated that the trend of using an interactive whiteboard and smartboard is increasing in developed countries to present content and detailed information in classrooms. McLoughlin and Lee (2010) stated that educators and institutions are gradually identifying the controlled culture of education and teacher designed contents or syllabi are consistently obsolete in the world of web 2.0. Brown and Adler (2008) argued that the evolution of high-speed internet has shadowed the demarcation between producer and consumer of educational contents and has opened indefinite access to information for all, and students as active participants can be co-producers of learning resources. With the growth of social networking websites, it is argued that students will enter various websites knowingly or unknowingly through social tagging systems where they begin to exploit their social parameters and generate ideas out of them (Wheeler, Yeomans & Wheeler, 2008). Web 2.0 features allow anyone to create, organise and share content as he or she wishes to fulfil their desires and needs (McLoughlin & Lee, 2007), and has opened up new ways of learning in one's own environment individually or in the group (Lemke, 2010). However, Wheeler et al. (2008) criticised social networking websites like wikis as they may have a number of issues of quality, authenticity and

plagiarism. On the other hand, they suggested encouraging the students to contribute their thoughts, discoveries and ideas to wikis or similar online group discussion boards in order to enhance the development of their contents.

Haddad and Draxler (2002) stated that educational organisations have integrated various technologies in pedagogies to break through a static process where students gather information, teachers transmit information, and the students are simply involved in the reproduction of what they hear and see. However, Collins and Halverson (2009) stated that the booming situation of the digital age where children spend over six hours interacting with television, video games, websites, online chat, emails, and other social networking sites is more than hours spent at school or possibly even sleeping. To effectively integrate digital technologies, they suggested that educators must allow the learners freedom to express their ideas and be made to play a critical role in their learning so that they can feel ownership over their information. McLoughlin and Lee (2010) argued that the world is transformed because of technological and social change, whereby an individual needs to be dynamic to engage in various trajectories and reskill at different levels of their life. Sharpe, Beetham and Freitas (2010) contended that, in this digital age, learners are consistently creating something out of physical and virtual environments in formal or informal contexts. Similarly, Freitas and Conole (2010) argued that personalised learning environments mediated by digital technology and associated tools provide learners with authentic and rich experiences that enable them to accommodate in persistently shifting social contexts. But Facer and Selwyn (2010, p. 39) stated that the new models of learning in the virtual environment should be carefully and cautiously built into educational organisations if the educators wish to promote emerging models of collaborative and personalised learning.

McLoughlin and Lee (2010) contended that web 2.0 has enabled the participants of social networking websites to co-create and add value in their activities, which comprise of their ideas, practices and attitudes. Youngs (2013) insisted that we must understand that digital society does not cause creativity to happen, but it enables the connection of diverse people from multicultural societies in the world who share their experiences, interests and thoughts among them to create new ideas. However, he argued that creativity should be cultivated and developed. Tan (2015) argued that

practices of providing extensive learning materials and giving tests in schools raised the question whether opportunities for learners to freely think are fewer now than before. In a similar vein, Kay (2010) suggested that significant achievement in school no longer guarantees lifelong opportunities, jobs and career as in earlier generations.

Gilbert (2005, p. 119) stated that ICT in today's society can connect learners in different locations of the world to the vast amount of digital information. Gilbert contended that ICT in schools provides essential tools for bridging the digital divide through which digital information can be offered to a number of people. Here, Reeves (2010) defined the meaning of sharing as the contribution of the learners. He argued that 21st-century learners are not merely consumers of education rather they are co-producers of knowledge, who are evaluated on the basis of their impact on their communities and the world (*ibid*). Wheeler et al. (2008) said that the latest innovation of Web 2.0 has made it possible to create unlimited webs exponentially in any ways the users intend to and that this has empowered students' personalisation of learning directions of their choice in the digital territory. Ott and Pozzi (2011) emphasised that ICT provides flexible time for the learners to access a huge amount of information on their ways and to build up their learning path by their personal interests, desires, needs and aims, and that they suggested utilising ICT in teaching and learning activities as it has already been nurtured in the informal life of learners.

Siemens (2014) stated that learners choose what information they want from the diversity of opinions and should be allowed freedom of their information because the right answer today may be wrong the next day due to the rapid changes in the digital information environment. Sharpe et al. (2010) described today's learners as active participants of a digital environment and creators who make tactical choices of using digital applications and learning strategies. They have personal reasons for choosing their suitable time, different technologies according to the situation, various social contexts that suit them, and the amount of information and the resources (Sharpe & Beetham, 2010, p. 92).

These writings demonstrate how the potential of internet to allow learners and teachers to share their ideas, contribute something and create their e-learning environment is valued in the developed world. Before such possibilities can occur in

rural contexts in Nepal may take several decades and will require strategic planning and resourcing.

Student Engagement

Although different disciplines like psychology and sociology have tried to define student engagement, it seems that there is a need for a more comprehensive definition. Newmann (1992) suggested some indirect indicators such as the amount of participation in activities, the amount of time spent in study, the portion of completed task, the intensity of concentration and interest they expressed to be considered to measure the level of students' engagement in academic activities. Akey (2006) also emphasised that the degree of students' participation and their intrinsic interest in their study related activities indicates their academic engagement, which involves both behaviour and attitude. He explained that student behaviours can be their determination, effort and attention, and other elements like motivation, positive thinking, enthusiasm, interest and pride in success reflect their attitude. Thus, he commented that engaged students show curiosity and desire to pursue various activities beyond the classrooms and achieve success or learning.

Lemke (2010, p. 246) stated that teachers can play a very crucial role creating opportunities for students by balancing the difficulty of their task with their current learning styles. She argued that "visualisation, the democratisation of knowledge and participatory learning" motivate learners to engage in learning fully. Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur and Sendurur (2012) in American high schools identified that students did not like traditional style of working in worksheets and homeworks and were more interested to be online on Facebook, MySpace and other messengers, and recounted how he used these tools in his classroom to engage them in learning activities. Some researchers, such as Poskitt and Gibbs (2010) and Reading (2008), have explained student engagement in terms of emotional engagement, cognitive engagement and behavioural engagement.

Emotional engagement

Emotional engagement involves individual interest, happiness, likes, dislikes, relationships, respects or values (Reading, 2008). Poskitt and Gibbs (2010) explained that students' emotional engagement is realised in the relationships between student and student, student and teacher, and students' feelings, attitudes, expressions, social

activities and events. Bruckman (2002) illustrated that there are a number of online communities of people where learners can get not only technical but also emotional support from each other who participate in the communities. Henry's (2015) interview with children explored that the children use ICT tools to interact with their family, friends and others, spent a lot of time watching movies or playing different games that they search on the internet and develop ICT skills unknowingly while experiencing new media. Akey (2006) found that a supportive network of relationships influences the motivation of learners although learning is an individual cognitive and emotional process, and that she suggested creating an interpersonal friendly environment for the students in the school where they feel free to share their ideas and engage themselves with learning matters. Kennewell and Morgan (2006) emphasised that technology-enhanced learning activities need to be play-like, social in nature and self-directed.

While engaging learners, Kennewell and Morgan (2006) advised teachers not to ask learners what technology they have at home but rather to ask them how good they are with technology. Goodison's (2002) research found that the teachers' lessons with ICT must match the interest and level of learners to engage them in learning activities.

Behaviour Management

Poskitt and Gibbs (2010) stated that behavioural engagement of the students is observed when their classroom presence complies with school terms and conditions. Protopsaltis et al. (2009) suggested that the use of digital technologies, like CCTV, audio and audio-visual recording devices, are useful to monitor the activities of students in the classrooms, and to motivate and improve their behaviour. However, some studies (Ang & Wang, 2006; Lee, 2002; Lim, Nonis & Hedberg, 2006) revealed that well-trained teachers, sufficient infrastructure of technologies, interactivity features of multimedia, such as 3D graphic, sound and animation, play a significant role to motivate and engage learners.

Bruckman (2002) argued that when children are active members of online communities, they share their daily activities, problems, frustrations, learning difficulties, needs, desires and interests with each other and that can motivate and support their learning. Some studies in England (Passey, Rogers, Machell & McHugh, 2004; Wall, Higgins & Smith, 2005) found that the use of internet increased primary

school children's time for games, enabled them to search for whatever information they liked independently and to better express themselves.

Hester et al. (2004) argued that in addition to motivating learners, how to prevent students' negative behaviours and intervene to foster appropriate behaviours of children largely rests on teachers. Some researchers (Parr & Ward, 2011; Türnüklü & Galton, 2001) argued that the meaning of misbehaviour or negative conduct of students may depend on the perception of teachers in different contexts, but the common sense of negative behaviour is perceived as the threat to academic performance. Whittaker (2011 January 12; retrieved 2017 September 4) contended that "teaching, learning and behaviour" are inseparable aspects of education. Whittaker argued that just introducing software that enables the school to record, monitor, analyse and manage student behaviour can be problematic unless real-time analysis of actual behaviour of learners is done to reinforce positive conduct of students in the school. A study by Bate et al. (2012) in Western Australian Schools found that children using the individual computer with internet connection engaged themselves playing games and watching vulgar videos on websites ignoring their lessons in the classroom. After a modification of parental control policy on the computers, the students avoided surfing randomly on the internet and wasting time on irrelevant games. But Loveless (2003a) found that poor internet and low-level of practices may frustrate the children although they have a positive attitude of learning with digital technology. However, some studies in British schools reported that the use of digital technology teaching and learning activities controlled the drop-out rate and brought positive behaviours (Underwood, 2009) and engaged the children in absence of teachers (Goodison, 2002).

Another important job of teachers is to support disengaged and at-risk students in the classroom. DuFour and DuFour (2010) emphasised that a school can monitor students' learning continuously, gather evidence of their behaviours to inform the teachers, principals and other administrators, help the learners who need further support in their learning activities and improve their continuous learning process. Some researchers (Kennewell & Morgan, 2006; Loveless, 2003a) suggested that teachers need to understand learners' external environment of using digital technology and provide a similar environment in the classroom where students feel freedom to

share their ideas. Passey et al. (2004) found that, with the assistance of ICT, at-risk students improved their performance, worked independently without hesitation, and engaged themselves even outside the school. A study in Singapore (Ang & Wang, 2006) illustrated that teachers' virtual demonstrations attracted students including those frequent absentees who were disruptive, talkative and easily distracted from their lessons, made them be punctual, regular and dutiful in the classroom and even inspired them to stay after school hours.

Cognitive engagement

Poskitt and Gibbs (2010) stated that cognitive participation of students is realised in their strategic action, learning plans and mastery over their achievements, but acknowledged that it is much harder to identify cognitive engagement than behavioural engagement. Kennewell and Morgan (2006) stressed the importance of providing adequate opportunities to play on computers and the internet so that learners can explore new features, experience failure and overcome it, and achieve a higher level of efficiency with technology. They contended that the opportunity provided to learners to reflect their knowledge increases their cognitive engagement. Hayes (2007) found that children in their classrooms moved to individual learning independently after the provision of almost one computer to one person. The change in learning style in the context made teachers design individual learning programmes for each child. Bottino, Ferlino, Ott and Tavella (2007) found that students' cognitive level influenced their level of performance, but that learners were able to generalise the strategies they acquired at the initial stage of playing computer games when playing more difficult games. Nevertheless, Lim, et al.'s (2006) findings reflect that some of the students, while engaging themselves in a QA online game in Science classroom, expressed their frustration and became disengaged because they could not complete their task.

These studies show that even developed countries are struggling with the management of internet facilities and with making students use technology relevant to curriculum learning. The context of these studies is very different from Nepal. However, the writings provide a warning that it may not be enough for Nepal to simply follow western leads; it is also important to carefully negotiate what learning is desired.

Communication of Information

A statement from the New Zealand Ministry of Education emphasised that digital technology provides a wide space for parents, families and other stakeholders to connect with schools using discussion board or websites, and allows students from their locations to access information for their self-directed learning in their interested field and expertise (MoE, 2017 September 4). Eady and Lockyer (2013) suggested that the use of digital technologies in the classrooms can link students with each other and with others outside the school, such as their parents, relatives and interested groups, and that open sources of online information can engage them in their learning activities. Cleanor and Trinder (2010) argued that with the proliferation of web 2.0 tools, technology-enhanced learning has become a more flexible way of providing course contents for learners, and some learners choose and use different digital technologies distinctly for personal and learning purpose whereas others naturally make use of personal as well as institutional devices in a common way for learning, communication and daily life. Lemke (2010) advocated using Web 2.0 in schools to engage learners in learning activities, meet their individual needs, and promote their *critical thinking* power. On the other hand, Gilbert (2005, p. 120) argued that the vast amount of online information the learners have access to is not knowledge, and a broad range of information does not necessarily lead to vast learning. However, McLoughlin and Lee (2010) stated that today's learners are looking for greater independence, connectivity and experiential learning.

Boud and Middleton (2003) stated that learning opportunities primarily occur in the informal contexts among working colleagues, and Schlager, Fusco and Schank (2002) explained how newcomers join communities of professionals where they share their ideas, methods and contents that help novices learn about their profession through participation in different work groups. Cuthbert, Clark and Linn (2002) suggested that Vygotsky's zone of proximal development could be realised in designing a community of learning for students and teachers. The principle emphasised the context where learners can complete their tasks with the support of their colleagues or others, which Beck, Bonss and Lau (2003) called 'reflexive modernisation' theory. They explained that the current culture of self-directed learning by participating in personally chosen virtual groups is reflective practice of existing knowledge and skills. Burrows and Nettleton (2002) argued that the new culture of learning with

digital technologies has ended the traditional faith on authority, such as doctors, teachers and scientists, but also has engendered risks and challenges.

Levin and Cervantes (2002) emphasised that the systematic ways of engaging learners and teachers in the culture of network-based communities can lead them to productive learning and help create an appropriate learning environment for diverse groups of learners. DiMaggio, Hargittai, Neuman and Robinson (2001) considered technology as the product of social needs that have been continuously bringing social transformation and changing the lifestyle of coming generations. They believe that three major factors: (a) equality in access, (b) rules of privacy, and (c) governing rules for protecting intellectual property influence the scope of internet and its social impact. Bargh and McKenna (2004) stressed that internet is an intervention in social life that allows individuals to connect with others, be familiar eventually, present themselves socially and introduce as the members of their community.

Brey (2006) argued that, although the proliferation of internet facilities has provided benefits of obtaining instant 'information, communication, commerce, entertainment and social interaction', digital contents may be harmful and dangerous too. Therefore, as Jones (2002) indicated, it is essential to learn about various online communities and find reasons of forming, boosting and diminishing the online communities before joining them. For example, Flanigan and Babchuk's (2015) study on students' experiences of using social media in the United States revealed that most of the students in their classroom hid their smartphones under the desks and spent at least fifteen minutes on social media in each class. However, Ott and Pozzi (2011) suggested that the use of ICT supports students' collaborative learning activities and offers an interdisciplinary approach of learning cultural heritage linking with broader disciplines like history, social studies, culture, economics and geography.

The majority of these studies emphasised that access to internet and digital devices provides the learners and their family members with opportunity to share their ideas with teachers and opens up freedom of learning for the learners in their own way in a collegial environment. Despite the benefits of using digital technology in teaching and learning, some of these writings show that there are issues with open source of online information even in developed countries. Both groups of argument highlight the difference in contextual opportunities between developed countries and rural Nepal.

Schools in rural Nepal do not have the resources or the training to utilise ICT in the way it is discussed in international literature. Moreover, as Nepal as a whole moves to greater use of ICT in education, it will need to be aware of the dangers as well as the opportunities described in the international literature. Currently, there is no indication of such consideration in policy documents.

Teacher Education and Professional Development

Many international studies have emphasised the importance of teacher professional development to keep teachers up to date with the social change and needs. Gibson, Moline and Dyck (2011), writing in a Canadian context, argued that school teachers need skills to fix technical problems with the computer, more experiences of ICT and their subject-specific pedagogy courses to blend ICT in their teaching activities. They also emphasised that teachers in their pre-service course continuum should be provided with maximum opportunities to experiment with pedagogical technologies while they are learning to teach. Komis and Jimoyiannis (2007), from their study in Greece, stressed that pre-service teacher training on ICT use must cover teachers' teaching culture and attitudes to prepare them for using digital technologies mentally and socially.

From a study in British schools, Loveless (2011) found that some teachers using Virtual Leaning Environment (VLE) Moodle in their pedagogy with the support of their ICT specialists valued the contribution of VLE Moodle, but some found it emphasised their isolation. Vratulis, Clarke, Hoban and Erickson (2011), from their study among pre-service teachers at a university in British Columbia in Canada, found that pre-service teachers preparing their lessons on the animated form of technology were highly motivated to work collaboratively and they were able to reflect their skills in their actual teaching in the classrooms. Similar research conducted by Perkmen (2014) in Singapore revealed that the motivation of pre-service teachers enrolling into teacher education made a significant difference in their use of technology in education and their self-efficacy in integrating ICT in teacher education resulted in much better classroom practice. Goktas, Yildirim and Yildirim (2009) suggested that universities should establish laboratories for pre-service teachers to use ICT tools efficiently and to be able to later embed them in classroom teaching. Niemi (2003) argued that university teacher education programme should be oriented to

provide theoretical and practical knowledge of ICT so that teachers can apply it in a new environment.

From the professional point of view, the Teacher Development Association in England defined teaching as more than earning a salary but rather as a career that offers challenges as well as extraordinary gratification, and argued that teachers are models, as well as leaders, who have potential to shape lifelong skills of children by sharing knowledge, ideas and interests (TDA, 2017 September 1). The Education Council in New Zealand emphasised that the profession provides opportunities for teachers to be involved in learning communities and bring a difference to the lives of the new generation (Education Council, 2017 September 2). Kalogiannakis (2010) in Greece found that acceptance of ICT in teaching and learning remodels the role of teacher beyond out-dated teaching strategies. KabakÇI (2009) emphasised that training teachers to use ICT is to equip them with the knowledge, attitude and skills to use ICT efficiently in their profession. Donaldson and Knupfer (2002) suggested that teachers must be well-trained to achieve the important role of computer technology in schools and solve possible obstacles in its application. The study of Bradshaw, Twining and Walsh (2012) of a CPD programme in England found that after ICT practice in the classroom as continuous professional development (CPD), teachers were able to measure the impact of the changed practice on teacher, school and students. However, the researchers found that the attitude of teachers towards the technology played a vital role in learning how to use it. Through investigation of virtual and face-to-face activities, Kopp, Schulze and Mandl (2008) found that the combination of web-based training, virtual conference room, behavioural acceptance and motivation influenced the attitude of teachers.

Bessenyei (2008) argued that formal ICT training in schools develops teachers' basic as well as advanced skills that foster the learning of students outside the school. Thorburn (2004) stressed that teachers should be trained in technology application regularly, focusing on student learning but not technology, to upgrade their professionalism. However, Haddad and Draxler (2002) argued that *one-shot training*, no matter how effective, cannot be sufficient and that lifelong professional development is needed for teachers, consisting of initial training, upgrading skills and continuous support. Drent and Meelissen's (2008) study in the Netherlands found that

teachers' lack of ICT competence was an obstacle for the incorporation of ICT in pedagogies.

Vratulis et al. (2011) argued that a learner can explore many things with technology rather than just sitting in the rear of the classroom anonymously. Anderson and Dron (2011) claimed that there is a correlation between technology and learning theories. They identified three perspectives. Firstly, the concept of *cognitive-behaviourist pedagogy* refers to the learning as behavioural changes through stimuli which guide computer-assisted instruction and programmes. Secondly, the *socio-constructivist pedagogy* is based on the learning theory of Vygotsky and Dewey which values learning rather than teaching. Thirdly, the *connectivist pedagogy* is designed with the concept that the learners can create their community to participate actively utilising computer programmes to provide interaction. Vesisenaho and Dillon (2013) stated that ICT in pedagogical practice opens up possibilities for learning across the boundaries of institutions creating a virtual learning environment (VLE). My study suggests that in rural Nepal such linking of institutions is still at a very minimal level.

Tezci (2009) argued that higher level experience develops a positive attitude of the teachers towards ICT and teachers' knowledge of using ICT in teaching and learning process and in turn impacts on teachers' use of technology. Moursund (2005) stated that ICT creates several problems such as digital equity, additional investment in a school's infrastructure and structuring and providing appropriate ICT education for pre-service and in-service teachers. Henderson (2011) explained that the individual learners have at least two different environments: school and their home where they may not have individual access to digital technologies for their learning activities, and bridging this gap between school and home always remains a challenge in classroom teaching and learning activities.

These studies indicate that teacher education in the universities in developed countries can provide necessary ICT skills and continuous professional development programmes to further develop teachers' skills. But, the universities in Nepal do not seem to be ready to address ICT in their teacher education programmes. However, these international studies draw the attention of institutions and the Government of Nepal to think about the extent they may need to adapt to the global changes.

Online Learning Communities (OLC) for Teachers

Lioyd and Duncan-Howell (2010) explained that online teacher communities can share a common virtual blackboard where they meet each other, share common objectives and establish belongingness among them. Teachers involved in such communities do not have a fixed path or destination as participants in the communities can detour their journey and speed their progress on their own. Goretsky (2016 May 15) reported that nowadays teachers and students in developed regions have easy access to various social networking sites such as Hotmail messenger, Yahoo messenger, Gmail chat, Facebook, Chat On, Whats app, Viber, Skype and many more easily available on smartphones. Lave and Wenger (1991) introduced the concept of *Community of Practice*, perhaps the first concept of an online teacher professional development community, with the aim of supporting learning among the members of a team beyond classroom mentoring and teaching.

In 1999, the Microsoft Corporation launched the *Classroom Teacher Network*, providing teachers with support to share their lesson plans, participate in online seminars and discussion groups, and explore links to digital resources (Redmond, 1999 October 5). Various researchers have reported that when teachers participate in these virtual communities that have global reach, they benefit from their active involvement and maximum practice (Bjerede et al., 2010), improve information literacy (Wang & Yang, 2014), fulfil their needs (Khalid, Joyes, Ellison & Daud, 2014), and get greater opportunities to develop professionalism (Ross, 2011). Bjerede et al. (2010) discussed the merit of teachers accessing digital resources and expanding their learning in their flexible time during school hours or outside the school boundary without affecting their teaching period and suggested that such online communities are vital, especially for those who are new and face teaching problems in their beginning days. Ross (2011, p. 11) suggested that teachers, particularly those who are new, can benefit from online communities when they face teaching problems but do not get time to discuss issues with other mentors or colleagues.

Riding's (2001) research, relevant to beginning teachers' online community participation in England, revealed that, although teachers prioritised student discipline and classroom management, they found problems in dealing with diverse students particularly with special needs or from socially and economically disadvantaged

communities. However, the teachers in the study never used online communities of teachers to discuss and solve their problems; rather they used online resources regularly. However, Hur and Brush's (2009) study on the K-12 teachers' participation in online groups found that by participating in online groups teachers safely shared their emotions, like daily classroom stress and issues relevant to their course contents, which they could not discuss with their colleagues in the schools. Riordan and Murray's (2012) study of MA students in an ELT programme in Britain also found an online community of practice to be very positive as the student teachers could interact with each other sharing their teaching experiences.

On the other hand, Jong (2012), in a European context, revealed that teachers who were enthusiastic to be involved in online teacher learning community for their professional development lost their interest when they could not find contents relevant to their teaching on the discussion sites. However, further redesigned mini-groups worked much better to attract them in online discussions. Also a similar practice on FarNet, an online community of Māori teachers in New Zealand, which initially was a very exciting group, failed to flourish (Liu, 2012). Liu, therefore, suggested that the participant teachers must have goals to participate in the online community which cannot be imposed upon them without regard to their needs and interest. In other words, there must be an "organic connection" (natural relationship) or "ecological environment" (Wang & Yang, 2014, p. 217) between teachers' real teaching and their professional development. Seo and Han (2013) found that online group teachers established a natural relationship among themselves in various online collaborative activities such as storytelling, sharing educational materials, online question and answer, peer support and workshops. However, they suggested that further research was required to be conducted on the aspect of participation and contribution of teachers because some teachers only used others' materials.

Cho, Ro and Littenberg-Tobias (2013) found that teachers have a choice to decide where they can best form a group of their interests, subject matters or social contexts in more than one way. Khalid et al. (2014) found that besides the positive approaches to the online teacher communities, there are factors like different social backgrounds, time and need of teachers that affect their participation in communities of practice. Seo's (2014) study of a teacher-centred online community in Korea reported that the

teachers who were unsatisfied with the lecture-based teacher training by university professors and educators made an online community, where they could post their problems, questions, comments and other teaching matters. The number of participants rapidly increased in the online community because they liked the authentic context of professional development (*ibid*). Similarly, Trust's (2015) study of an Edmodo math subject community discovered that the members freely shared their content knowledge and explored more diverse ideas from the online community than from a small local group of experts.

These writings emphasise that various online communities provide teachers with opportunities for sharing their problems and ideas relevant to their profession. However, teachers in rural schools in Nepal may have to wait decades to get reliable internet in the mountains and to get access to digital portals.

Teachers' ICT Literacy and Capability

Henderson (2011), from an Australian context, reported that teachers using computers and other technologies considered the teaching of literacies as separate from those technologies although they considered both learnings of literacies and technologies equally important. She suggested that teachers need to rethink the learning of literacies not only for the use of digital technology but also for teaching various skills to learners. The Educational Testing Service (2002) reported that those who fail to acquire a new concept of ICT literacy will also fail in other ways as the societies and economies grow and change over time. The report emphasised that the notion of ICT literacy does not mean just having technical skills but also involves a broader sense of cognitive skills and application of technical skills. The panel suggested that the growing generation needs to understand the definition of ICT literacy as including five components: *access, manage, integrate, evaluate and create*.

However, Rambousek, Štípek and Procházka (2013) found that primary and lower secondary school teachers in the Czech Republic had a misunderstanding about ICT literacy as they did not link ICT with teaching activities which are not directly linked to the development of ICT competencies. Radetić-Paić and Ružić-baf's (2012) study at a Croatian university found that teachers perceived computer games as killing the valuable time of students and hampering their regular activities whereas the students doubted their teachers having sufficient knowledge about computer games and about

the negative impacts of information technology use. Dawes (2001) argued that teachers should not be threatened by emerging technologies or by the technological skills of their students but only by their own lack of knowledge. Henderson and Honan's (2008) study of Australian school students' socioeconomic backgrounds and digital technology access revealed that teachers failed to understand students' outside-school life with digital technologies and were unable to link the games and other technologies to their teaching activities.

In addition to ICT literacy, Loveless (2003a) suggested that teachers need to learn about ICT capability as a subject until necessary skills are obtained to gradually link with teaching of various subjects. He argued that it is not just important for someone to have skills of how to use technologies or ICT resources, but also to know why and when they can be used. He also suggested that, while considering economic, social, intellectual and pedagogical aspects as the reasons of integrating ICT in education, it is necessary to think about how to develop the programmes and use ICT effectively and appropriately. Chai, Koh, Tsai and Tan (2011) emphasised that technological, pedagogical and content knowledge (TPACK) is essential for teacher preparation because the contextualised application of ICT depends on the teachers' multi-dimensional understanding of a particular group of learners in particular learning environments.

Trushell, Slater, Sneddon and Mitchell (1998) found that teachers produced through school-based training and PGCE course in the United Kingdom preferred to have high access to the technologies to build up confidence in the use of technologies before going to actual teaching in schools. Markauskaite (2007) argued that teachers' ICT-related capabilities are reflected in the improvement of students' learning outcomes and their ICT literacy. Salleh and Laxman (2014) asserted that the positive attitude of teachers towards ICT use in their instructional activities increases their ability to control ICT integration, raises their motivation to search better strategies of ICT applications, and then makes them able to use them. Pachler (2001) advised caution about the impact of ICT on pupils, and suggested students need to be equipped not only with the fundamental but also with the higher level technological skills to be successful associates of virtual culture. However, Niemi's (2003) study in Finland found that the ICT projects run by schools very often remained isolated from other

schools and teacher education communities, and had problems to be integrated with the traditional culture of school and teacher education practice.

These writings not only indicate that even developed countries are struggling to develop teachers' ICT knowledge and skills, but also could serve as a warning to developing countries like Nepal that the introduction of ICT into education will require more professional development of teachers than a simple induction course.

Support for ICT in Education Implementation

International studies address individual, organisational and social support for ICT in educational practices. There are three dimensions to be considered: educational policy and the provision of ICT resources for teaching and learning that are influenced by economic, social and cultural contexts, technologies in pedagogical performance, and the development of teachers' ICT knowledge or technological pedagogical skills (Loveless, 2011). Organisation for Economic Co-operation and Development reported that the investment environment for the private sector is another important aspect of developing ICT and its growth (OECD, 2007).

Dawes (2001) claimed that lack of proper equipment, training and regular evaluation systems are major barriers for many teachers to practise ICT in their contexts, and that uncertainties about uses of computers for pedagogical purposes cause teachers to feel exhausted from using ICT. Goktas, et al.'s (2009) study in Turkey's pre-service teacher education revealed some common barriers such as inappropriate course contents and pedagogical plans, lack of time management and administrative support.

Schwanenberger et al. (2013) insisted that leaders must have a long-term vision about emerging technologies, and that they have to change their thinking about how students and teachers can use knowledge and skills. Woodill (2004) also stressed the role of leaders and the importance of their making the right decision while moving exhausted schools and teachers towards the digital schooling, because of the extent to which the digitisation of information can change everything. Ertmer, et al.'s (2012) study in American schools found that teachers were frustrated in using technologies in their teaching and learning activities because of weak administrative support and delayed feedback from the state.

ICT Changing Pedagogy

From the constructivist perspective, learners are *critical thinkers* who solve their problems by engaging themselves in tasks (Donaldson & Knupfer, 2002). Muniandy, Mohammad and Fong (2007) stated that learning theory, methodology and technology cannot in themselves be effective in bringing about changes in educational practices and learning outcomes. However, they argued that the use of technology can transform learning theory and methodology in which learning theory can be linked to constructivism and technology. Chao and Stovel (2002) suggested that teachers need to create authentic contexts for learners in the classroom, because learning takes place when previous knowledge has an association with the new information. Krumsvik (2005) reported that students said that they discussed problems in the lab with friends, but would not be able to manage in the absence of the teacher. He also stated that teachers' practice of ICT in teaching and learning challenges the hegemony of textbook and demands integrated knowledge. Some studies in developed countries have emphasised that digital technology should be recognised as an immediate environment for children because the use of social media promotes interactivity either through audio or video, and shifts the passive realm of reading to an interactive mode of digital pedagogy (Roth, 2009), provides opportunities for the construction of knowledge (Griesemer, 2012), and develops children's language, social and motor skills (Edwards, 2013).

Various studies in western countries reported that web technology is gradually shifting the traditional *chalk and talk* teaching strategy (Stensaker, Maassen, Borgan, Oftebro & Karseth, 2007) and has provided teachers with opportunities for designing innovative pedagogical approaches (Tolani-Brown, McCormac & Zimmermann, 2010, p. 221). However, teachers need to be trained well to incorporate new technologies with learning theories (Donaldson & Knupfer, 2002) and be acquainted with reciprocity between technologies and student-centered pedagogies to shift traditional pedagogy to modern learning (Drent & Meelissen, 2008). Teachers need to be able to deviate the ways of teaching today from traditional ways (Demirli, 2013) and understand how to apply instructional technologies guided by learning theories – *behaviourism to cognitivism to constructivism* (Donaldson & Knupfer, 2002).

Some researchers (Krumsvik, 2005; Lourdusamy, Koon & Khine, 2001; Olelewe & Amaka, 2011) have contended that ICT enables presentation of abstract ideas in concrete ways, decreases unnecessary lectures and promotes constructive instructional strategies, individualised and collaborative learning, and it may be today's strategic solution to create a space for the learners to think, discuss and learn among themselves. Many others (Meier & Spada, 2008; Roth, 2009; Stensaker et al., 2007) found that the rapid growth of ICT use has internationalised and commercialised higher education and provided opportunities for part-time, interactive and distance learning.

McCormick (2004) described two ways of collaborating through network technologies: from the cognitive constructivist point of view, learners bring ideas from peer collaboration and construct their thoughts; from the social constructivist perspective or situated view, learners do not look for personal creation but for joint creation. Somekh (2007) argued that there is need to realise the impact of ICT on the popular culture and the daily lives of those learners outside school. However, Ertmer et al. (2012) described the case of a maths teacher who knew his students had been already familiar with digital divides and found his students creating podcasts, posting on blogs and commenting on them. Komis and Jimoyiannis (2007) argued that availability of ICT tools in itself does not promote the teachers' use of those technologies for pedagogical activities.

These studies have emphasised that the use of ICT in teaching activities in developed countries have reduced the dominant role of printed textbooks and talk-and-talk teaching strategies. However, the teachers in poor rural Nepal where people cannot afford expensive technology would only dream about such schooling for their children.

Preparedness for Rapid Change in Technology

Adams (2011) contended that when new technology arrives, it entails pedagogical and institutional reorganisation based on individual and social ethical values. Furthermore, Albirini (2007) argued that adopting the technology, its theoretical assumptions and paradigmatic conflicts, are issues that need solution. Loveless (2003b, p. 9) stated that the rate of technological change is so fast that the most powerful computer in one year becomes very basic the following year. The nature of technology seems to be ever-

changing which generates a continuous challenge for teachers to create a sustainable environment to use ICT confidently and efficiently in classroom teaching and learning (Tezci, 2011). Simultaneously, there is a challenge for teachers dealing with potential changes in curriculum content, pedagogical activities and assessment process (Moursund, 2005). Thorburn (2004) emphasised that it is essential to equip teachers with professional skills so that they can adapt to changes.

Lin, Wang and Lin (2012) claimed that integration of ICT cannot be imposed upon teachers, but a model of technology and pedagogy together can be adopted in teaching and learning. However, Bates (2000) argued that integrating emergent technologies, such as video-conferencing and the web, with the old teaching methods is easy because teachers do not have to rethink those strategies majorly. González-Lloret and Ortega (2014) argued that bringing innovative technologies into pedagogies invites more possibility of failing in their implementation, and, therefore, the educators involved in teaching should be provided more support in using ICT than learners.

Komis and Jimoyiannis's (2007) study of teachers' beliefs about ICT in education suggested that it is essential to motivate teachers and develop their awareness of ICT as a need of modern society. They also considered it important to examine difficulties teachers have to face in teaching, constraints that ICT brings in social communication and how it can isolate people. However, everyday innovations in ICT complicate the use of technology, which is a challenge for teachers to determine how they change practices in the face of constant and rapid change of ICT (Orlando, 2009). Martin (2006) suggested that the youth generation needs to become aware that digital technology increases the uncertainty of knowledge and information available in digital form. He argued that the information on the websites are not always obvious, and the quality is not assured.

Some researchers criticised schools for various reasons such as that schools do not direct students to "understand, navigate and deconstruct media-induced experience" (Sanger, 2001, p. 9), that they are very slow in changing with modern technologies (Selinger, 2001) and that they have a fear to integrate ICT in subject teaching as ICT specialists often teach students in an ICT suite separately (Somekh, 2007, p. 117). Many others (Clarebout, Coens & Elen, 2008; Selwyn, 2012) claimed that portable digital devices with internet provide an easy access to a wide range of learning

courses for learners, including physically disabled ones who cannot be present in school. However, Pachler (2001) suggested that educators should consider technologies in terms of ethical issues, such as authentication of a product and plagiarism in the curriculum. Bjerede et al. (2010) insisted that the privacy of students must be protected while allowing schools, parents, communities and researchers to access information, and that educational policy must ensure students' right to digital equity.

Some researchers (Donaldson & Knupfer, 2002; Jong, 2012) emphasised that teachers must have sufficient access to the technological resources and get support to become proficient at using those technologies meaningfully. But, Gümüş (2013) argued that just increasing the number of computers or ICT devices in the schools does not make a difference in the use of ICT. Bjerede et al. (2010) emphasised that the technological infrastructure made for the educational purpose must be feasible and powerful enough to adjust to new methods of teaching and learning with technology and be accessible to teachers and students. McGarr and Kearney's (2009) study in primary schools in Ireland found that the lack of up-to-date resources, weak technical support and insufficient time for teaching activities influenced the expected level of achievement of ICT use in the schools.

These writings emphasised that the rapid development of new technologies has challenged people even in developed countries. However, these writings also suggest that countries need to manage ICT infrastructure and workforce to use ICT in school education and serve to forecast challenges Nepal will face as it increases its use of technology in education.

Role of Non-Governmental Organisations (NGOs) in Nepal's Education

My data pointed to the very extensive involvement of NGOs in school education in Nepal. Therefore, it is important to review literature relevant to the roles played by development organisations in Nepal's education. Another reason was that the schools I selected for my study were supported by an NGO. I then reviewed various archived documents and the few journal articles available through google scholar. This section

presents accounts of the inception of NGOs in Nepal, their aspiration in Nepal, and their involvement in education.

Brief History of NGOs in Nepal

There were few non-governmental organisations which worked under the Government of Nepal's direct monitoring policy before 1990 during *Panchayat Democracy*[1] for 30 years, but the new democratic constitution in 1991 provided an open door policy to establish NGOs and get direct access to international funds to invest in various social welfare activities (Bhandari, 2014). Bhandari states that Tulsi Meher Shrestha established the first NGO called *Mahaguthi*[2] in 1923 with the purpose of social service in Nepal and it still exists. Another charity organisation, called *Paropakar Aushadhalay*[3] later renamed *Paropakar Sansthan*[4], established by Daya Bir Singh Kansakar was the second non-governmental organisation in Nepal and saved many lives during a cholera epidemic in 1948. However, international funding in Nepal started in 1951 when Nepal accepted US $2000 under the scheme of the *Four Point* programme (Whelpton, 2005; as cited in Wallenius, 2017). Since the new constitution was launched in Nepal in 1991 and NGOs started to receive foreign fund directly, the number of NGOs crossed 60,000 in the year 2005 (Asian Development Bank, 2005). On the basis of the increasing number of NGOs in the country, Bhandari and Onta (2017 February 24; retrieved 2017 September 9) estimated that the number of NGOs might be over one hundred thousand in the country. However, there are several similar unregistered local organisations in rural villages working in their own ways such as *Mahila Samuha*[5], *Upabhokta Samuha*[6] and youths' clubs in most of the villages in Nepal.

Aspirations of NGOs in Nepal

Beyer (2007) claimed that there are major two reasons – the interest of global governance and acceptance by states – which increased the importance of INGOs and NGOs all around the world. It means that the international organisations intend to

[1] A party-less democratic ruling system introduced in Nepal in 1962 and abolished in 1991, in which representatives were elected but the governance was under the control of the King.
[2] A village level organisation generated initially to support poor people in 1923.
[3] Charity medical
[4] Charity organisation
[5] Females' organisation
[6] Consumers' organisation

leverage the state policy through local NGOs and seek a legitimate place in governance. Lister (2003) argued that, although the general perception of NGOs is that they are organisations intended to deliver public service, advocacy and community development, the legitimacy of those organisations like *for who*, *for what* and *in what way* is not well theorised. Terje (1998) stated that development NGOs work with the hidden interests of international NGOs or donor agencies to intervene in under-developed and developing countries and the INGOs or donor agencies do not disclose their vested interest. Such intervention is quite visible in the context of Nepal, as, for instance, the reproduction of World Bank Policy to decentralise school management system in 2002 (Regmi, 2017).

Wallenius (2017) found that the management of foreign support in Nepal promoted de facto privatisation in which international donor agencies worked to launch their programmes directly with Nepal's NGOs. Rappleye's (2011) critical review of the flourishing NGOs in Nepal indicated that NGOs in Nepal act as catalysts to influence educational, economic and social policies, and overall development of the country. He showed that they do not manoeuvre independently, but operate as an *institutionalisation* of donor agencies' agendas and interests, which further continue to influence national policy and offer support in order to obtain more foreign aid. Therefore, she insists on the need to re-assess the existence of NGOs in Nepal as the instrumentalisation of NGOs may have hegemonic influence over Nepal's socio-cultural, economic and educational sectors.

Uphoff (1993) stated that the results of all grassroots and non-governmental organisations depend on the state, market and civil institutions. He suggested that it is essential to know how these networks can be made to operate better for raising economic, social and political output. He also emphasised that the organisations' scope and operations evolve in response to the public's ideas and aspirations. Banks, Hulme and Edwards (2015) argued that NGOs working with the interest of donor resources remain ill-equipped to intervene and unable to operate long-term transformative goals. However, Banks, Hulme and Edwards contended that NGOs can play a significant role in bridging the government, markets and citizens. Ismail (2017) argued that foreign-funded NGOs are unlikely to counter neoliberal development. He further argued that funding is not just financial trade that rolls out from developed to

underdeveloped countries, but it carries a materialistic ideology of organisations. In similar vein, Regmi (2017) argued that the Government of Nepal not only receives a huge amount of loan every year from the World Bank, that started with the Primary Education Project (1984-1992), but also reproduces the World Bank's project documents in Nepal's educational policy. He further revealed that such investments in Nepal's education have promoted the country's dependency on donors and that foreign organisations have obtained open space for investing in education, which increased privatisation and marketisation of education in Nepal. He argued that such investments might have benefited the country at some level but the self-reliance capability of the country is gradually diminishing.

The Social Welfare Act, 1992 brought in a regulation for INGOs to submit their project proposal to the Social Welfare Council (SWC) in Nepal to work with NGOs at the local level, which prohibited INGOs from implementing their projects directly (Social Welfare Council, 1992). Dhakal (2006) stated that the Government of Nepal has allowed and recognised INGOs and NGOs as development partners in the country's socio-economic development activities and local resource mobilisation. The government introduced the *Local Self-Governance Act,* 1999 and the *Local Self-Governance Regulations,* 2000 which allowed the INGOs and NGOs to work with local government bodies (Village Development Committees and Municipalities). However, Dhakal criticised NGOs which receive funding from INGOs or other donors, for the reason that the majority of them are run by the family members, relatives and a closed group of people, with the intention of keeping their financial transactions top-secret. Tanaka (2011) argued that the majority of NGOs in the country belong to a group of elites and very rarely include members from excluded, marginalised and underprivileged communities. She also stated that none of the NGOs in Nepal is completely successful in providing a model which can be applied throughout the country.

These critiques contend that development NGOs in Nepal work under the direction of their donors as catalysts to influence social, economic and social policies. The government seems to welcome more NGOs and foreign donation and take limited responsibility for development programmes in the country. My study shows the dependence of rural schools on NGOs for their limited ICT capability. The studies I

have cited suggest such dependence makes the schools and the rural sector very vulnerable.

Involvement in Non-Formal and Formal Education

The National Resource Center for Non-Formal Education (2000) reported that there are four types of NGOs, charitable, participatory, community-based and international, which have been registered in Nepal after the re-establishment of multi-party democracy in 1991. Although education was not their only objective, the majority of them initially launched non-formal education programmes in rural villages and urban slums to educate over 30% children who had never-enrolled in school, 50% children who had dropped out from primary schools and illiterate adults (*ibid*). Such initiatives increased the literacy rate of the country. There is visible involvement of the Asian Development Bank and the Department for International Development (DfID), United Kingdom in secondary education projects in Nepal which includes educational planning, teacher professional development, material development, test design, monitoring and programme evaluation (Sibbons, 1999, p. 196). The Government of Nepal has been investing significant amounts of loan money from the Asian Development Bank and World Bank in the education sector as well as in other infrastructure development in Nepal for many years. Karkee and Comfort (2016) stated that the majority of the 39,759 NGOs registered at the Social Welfare Council between 1977 and 2014 were intended to work in health service, community and rural development, environment protection, women service, youth service and HIV/AIDS control. They also stated that the majority of 517 NGOs registered for educational development across the country showed their presence with new school buildings and the rise in student enrollment. However, they argued that it is debatable if the contribution of such organisations has improved the quality of education in public schools because the overall result of the final year of schooling is below average every year.

Robinson-Pant (2010) from her study in Nepal demonstrated that many NGOs and INGOs stopped their projects in literacy development during the conflict between Maoists, the revolutionaries and the Government of Nepal in the first decade of the new millennium. She stated that the Maoists compelled the NGOs and INGOs to reach the rural areas with their projects and to make greater changes, but the donor

agencies influenced the direction of NGOs working in the literacy programmes. As a result, many of them stopped their projects and declined. However, Shields (2011) found that international development projects and NGOs' conspicuous presence in teacher training, school building construction, ICT infrastructure development and administrative reform in community schools in Nepal seemed to provide the capacity to implement educational programmes. Bhatta (2011) argued that in the name of educational reform the unequal partnership between the Government of Nepal and donor agencies (such as the World Bank, Asian Development Bank, USAID, DANIDA, UNICEF, European Union) has influenced the activities of the Ministry of Education. Stakeholders, such as district education officials, teachers, students and parents, are simply informed of the changed policies but never involved in the process of policy development, whereas the high-level authority reproduces and implements the documents of donor agencies (*ibid*). Sharma and Bhattarai (2013) argued that, although the open funding policy has allowed several donors to invest in various sectors in Nepal, no evidence proves the effectiveness of the policy. Instead, they suggested the need to reform governance policy in the country to alleviate poverty and improve institutions.

Overall these studies acknowledge that the involvement of development NGOs and other international organisations in Nepal's education programmes may perhaps benefit the people of Nepal to some extent, but they highlight the extent to which the organisations have highly influenced the policies of Nepal. These critiques of NGOs are an important backdrop to the data that emerged in my study.

Future of Organisations and their Support for Education

A study in NGOs' participation in health care in African poor countries revealed that the majority of NGOs are temporary and donor-guided, work with nominal responsibility and compete rather than collaborate with local communities (Pfeiffer et al., 2008). Acharya et al. (2017) reported an intervention in the health service sector in Nepal which revealed that collaborating with local government bodies and other organisational actors can create an environment for co-investing in a model which, if successful, could be replicated throughout the country. However, Mahat and Pokharel (2017) argued that, although NGOs could play a significant role to establish mutual relationship between the key stakeholders, such as government, the boards of NGOs,

the staff of NGOs and other civil societies or beneficiaries, these stakeholders did not have any collaboration in project activities in the field in Nepal. Instead, they found that the organisations were recognised by their individual programmes in the field.

As stated above, there are about a hundred thousand NGOs in Nepal working in various sectors. Sakya (2000) stated that the majority of the NGOs have been set up for personal benefits, and he calls these *pocket NGOs* which are not functional in the field but operating as a source of income, and *briefcase NGOs* which are sustained with the protection of high level power and money. He contrasted these with *real NGOs* which have been really working in the field. However, he emphasised that some of the real NGOs are performing better than the government itself, as in terms of community participation in school activities, teacher training, non-formal education and public participation in need-based education. But, in a report not directly addressing education, Browne and Dharssi (2014 May 7; retrieved 2017 September 18) stated that many NGOs, like orphanages and those working to control girl-trafficking in Nepal, pretend to be honest in front of donors but are examples of inefficient organisations. They also stated that the NGOs or civil societies are set up for business and none of them would like to work together. Beyer (2007) argued that the majority of NGOs in Nepal are weak, particularly in technical, managerial and analytical aspects to deliver services during emergencies like conflict or violations. However, Gurung, Gurung, Karki and Bista's (2011) study in the rural mountainous region of Nepal found that the NGOs' involvement, although only for the limited time until the project is over, do make a certain level of contribution in various aspects of people's lives in economics, education and agriculture.

These studies emphasised that NGOs do not readily work together to actually bring change in communities. Also the writings show that the majority of NGOs in Nepal are run by a closed group of people are not actually working in the field; rather the people who own such NGOs are making these organisations a source of income as they receive foreign donations. The data collected in my study does not involve information about the motivation or business connections of the NGOs involved in supporting ICT infrastructures in rural schools. However, I am mindful that these critiques, perhaps themselves requiring further research, need to be considered alongside the predominantly positive reports I received in the field. In my final chapter, I draw together these critiques and my participants' reports of their experiences with the NGO who provided them with digital devices and training.

Summary

This chapter has provided an account of the contextual differences in expectation that underlie the gap between Nepal's ICT practices in education and ICT development in western developed countries. I have realised that ICT use in teaching and learning activities in the rural context of Nepal is an under-researched area and there is relatively little published research. The literature from various policy documents indicated that Nepal is an early adopter of ICT in education. *National Curriculum Framework for School Education, 2005* was the first document which introduced ICT as a tool to be used to teach various subjects. However, the Government of Nepal only developed the document but did not develop a strategic plan on how to equip schools and teachers with ICT infrastructure and skills. After the publication of the reformed *National Curriculum Framework for School Education, 2007*, the Government of Nepal involved developmental organisations in the project to develop ICT in education. Although the *ICT in Education Master Plan, 2013-2017*, the first policy document, identified major infrastructures such as internet, skilled workforce, content development and system enhancement in education, strategies about how to implement this policy were not addressed. *ICT Policy, 2015* stated the intension of the government to create a public and private partnership to provide ICT infrastructure in government schools.

The reports published by the Nepal Telecommunication Authority showed that access to web technology is rapidly increasing in Nepal. In mid-2016, 50.11% of the total population had access to internet service. In mid-2017, about 58.72% of the total population could access the service. However, the majority of people use mobile data, which is too expensive to use extensively for educational purposes. A few studies such as Pangeni (2016) and Shields (2011) found that internet facilities have provided the current generation of learners with options of undertaking online and international courses from Nepal. However, rural Nepal has to wait another decade or more to get that service. The findings of Dawadi and Shakya (2016) suggest there are some challenges for implementing ICT in education, such as lack of skilled workforce, costly internet facility, low level of ICT literacy in rural communities, complex topography in hills and mountains, lack of electricity in the countryside and lack of security for ICT infrastructure in Nepal.

The literature relevant to similar contexts in developing countries indicates that the problems of implementing ICT in education policy are very similar to Nepal's grounded realities. For example, schools in Syria struggled with insufficient computers and unskilled teachers (Albirini, 2006), unskilled teachers could not successfully use available ICT resources in Peru (Maldonado et al., 2011), rural school teachers in India expressed frustration about teaching a large number of students with a limited number of devices (Ale et al., 2017). Some studies reported internet security issues such as open access information, vulnerable videos, and cyber-bullying. The impacts of such issues are found particularly in low-income countries where the schools fail to provide young people with adaptable skills to survive and grow in the technological world. Lack of teachers' previous knowledge and skills of using ICT is one of the issues in developing countries including Nepal.

The review of international literature provides an account of the gap between developed and developing countries. International studies of how ICT is practiced in developed countries can perhaps provide a framework to guide transformation of traditional pedagogy into modern strategies of teaching and learning and highlights challenges Nepal faces if it intends to implement policy statements.

While lack of web technology in Nepal and other developing countries is identified as an obstacle to realise the maximum benefit of using ICT in teaching and learning activities, the literature shows that even the developed countries have issues with open source of online information. Several studies reported that developed countries are struggling with the management of web technology. However, the rural context of Nepal, where there is no or limited internet, is very different than what is found in international literature. Nevertheless, Nepal, as it is beginning to utilise such facilities, needs to be aware of the dangers as well as opportunities described in international literature. Various research findings from western countries indicate that it is essential for Nepal and developing countries to prepare a skilful workforce, institutionally and collectively to make ICT integration effective. International literature shows that extensive use of ICT in instructional activities in developed countries has reduced the hegemony of printed textbook and traditional way of teaching, but it is beyond the capacity of poor rural people in Nepal who cannot afford such expensive technology.

Literature relevant to developmental organisations' involvement in education shows that the Government of Nepal considers developmental NGOs benefit the people of Nepal through various educational programmes such as the *One Laptop Per Child* project of the Open Learning Exchange (OLE), an NGO. However, several studies have criticised the role of NGOs in educational development for working in the interest of donors and for influencing the policies of Nepal. The literature shows that the majority of NGOs in Nepal are business oriented and are conducted by closed groups of people for their own benefit.

Chapter III: Challenges in Accessing the Field

Introduction

As many research advisors (Blaikie, 2009; De Vaus & de Vaus, 2001) have noted, planning to enter and entering the field is an important phase in any research design, and can be a challenge for a researcher. As an emerging researcher, I looked forward to this as an exciting as well as challenging stage of the entire research. Darling (2014) stated that entering the field can be a daunting, challenging and bewildering experience where the researchers may have to compromise with many assumptions and expectations. He noted that entry into fieldwork is often an early and harsh test of the research design and ethical demeanour that doctoral students have been theoretically trained to practice. This chapter discusses my experiences in entering the research field in a country ravaged by a natural disaster. That was Nepal following the April 2015 earthquake, which occurred immediately after my enrolment into the PhD programme.

With the assistance of three supervisors, I prepared a research design for investigating in-service teachers' ICT practice in rural primary schools in Nepal. The confirmation of my candidature and the gaining of approval from the Ethics Committee brought high enthusiasm and motivation to travel from Christchurch, New Zealand to the real ground of the research.

The Earthquake in Nepal and Resulting Changes to the Research Proposal

Padgett (2008) suggests that in qualitative research the researcher must have the sensitivity of an eagle's eyes, flexibility and immediate decision-making capability to carry out the research plan. During my planning stage, the 25th April 2015 earthquake and another major aftershock in the following week impacted on the initial design. The research proposal was initially designed with the expectation of exploring how in-service primary teachers in rural primary schools integrate ICT into their teaching plans and delivery, and why they chose to use ICT in their teaching. The 2015 earthquakes generated additional issues to be investigated, and the impact of the disaster on the use of ICT became a further research objective. The impact of the earthquake became a determining factor in selecting three schools in different rural

areas of Nepal: one of the schools was selected from a highly affected zone, the second from a less affected region, and the third from a relatively unaffected area.

Although most researchers enter the field of research with well-planned research strategies, Yin (1994) suggested that case study researchers need to be prepared to consider new partnerships and document findings as they occur. Similarly, Hurrel (2005) stated that the data collection process needs to go beyond an initially structured routine. Despite reading these warnings, I knew I had to prepare a research plan before walking into the research field. When I did walk into the area of research, I began to really understand the advice of Yin (1994) about establishing new relationships as I had to deal with other schools than those I had initially targeted. One of the reasons for changing the strategy was that the schools I had initially selected were all around the same region that was highly affected by the disaster and it would clearly be potentially hazardous to rely on that risk-zone where it would be difficult to get functioning schools with ICT. In this situation, Mukeredzi's (2012) experience in a Zimbabwean conflict area became helpful to understand the environment and helped me become prepared to make choices 'on the go'. Mukeredzi's decision to involve the teachers from this area in his research held serious risks for him and his participants. He reported how he needed to travel across rural village for interviews and how he and his participants had to climb tall trees to access a mobile network. The problems he encountered forced him to work within a limed timeframe and to rely on limited information. I, therefore, decided to explore and build new relationships to help me find reliable and accessible schools in different regions of Nepal.

In the course of travelling to the research field, I faced several hurdles. This chapter discusses the various challenges I faced in rural Nepal while collecting data in the field, particularly the difficulties in gaining access to the government and non-governmental organisations, organisations' behaviour to me, cultural and language differences, the geographical structure of the land, transportation, climate and weather, and communication. Even before dealing with the complexities in the research field, I had to face a financial challenge due to the earthquake itself and the following blockade by India: both had a direct impact on my family. As well as the psychological impacts of the disaster, the crisis of food, fuel and other essential needs (Dougan, 2015 May 4; retrieved 2017 September 6) brought unanticipated difficulty

for my family in Nepal. My father-in-law's house was destroyed; my wife and children lived in a tent in a public place for months, and I lost access to funding. Thus, the crisis in Nepal created unexpected and initially unsurmountable difficulties at the very start of my research journey. Fortunately, my college and the student development centre in the university provided some basic financial support for the year 2016. The welfare support from the university regenerated my energy and made research task once again more achievable.

Entering the Field: Access to Government, Organisations, Local Authorities and Schools

Opollo, Opollo, Gray and Spies (2014) pointed out that many researchers ignore the gaining of *access* as a part of research when they report their research, although it is one of the most significant aspects of a project. They emphasised that initial access to the various information sources, organisations or informants takes quite considerable time, and that it is useful for other researchers, as well as for readers of the research to know the strategy the researcher used to get access. Brahler (2012) suggested that it is easier to get access than to maintain access and manage relationships, although she agreed that there is no particular strategy for obtaining access and it rather depends on the research context, topic, country, participants and researcher's personality and adaptability. However, as Fjellström and Guttormsen (2016) pointed out, access is not fully under the control of the investigator. In their research project in China, they found it challenging to follow up on their gatekeepers' invitations to several events and find candidates for interviews.

In this study, it was difficult for me to find easy access to the field due to lack of an educational research council in the Ministry of Education. Therefore, I attempted to explore the research field directly myself through various channels like Department of Education (DoE), District Education Office (DEO), other local authorities, international non-governmental organisations (INGOs), non-governmental organisations (NGOs) and personal relations. In most of the cases, I verbally communicated with the officials, although sometimes their offices required a written letter about the purpose of research. The District Education Offices were initially visited, the purpose of the project was verbally explained, and I requested the officers to provide me with information about schools so that I could select sample schools.

However, the DEOs lacked sufficient information about what the Non-Governmental Organisation was doing in the schools although the NGO had a memorandum of understanding with the Department of Education. Therefore, I had to visit the NGO office to get sufficient information about the schools it supported in order to make a selection of schools and to get participants from them.

My initial plan for data collection was simply to visit the selected schools directly without any obstacles. However, it was not easy to approach the schools without any contact details like a mobile number or a landline telephone or email. Mobile communication is the most accessible medium for reaching people in Nepal where over 90% of the total population use cellular phones, and internet or landline phone is either unavailable everywhere or not a regular means of communication (Ktm2day, 2015). The next task was to find contact details of the headteachers or teachers, but while email is used by officials or professionals in the urban areas it is still rarely used by common people. Almost all the public schools in Nepal lack school websites and they do not have alternative email addresses like Gmail, Hotmail or Yahoo that would allow me to communicate with them. However, a few private schools own a website that gives easy communication for internet surfers. A lack of useful means of communication in the community schools is one of the barriers to access the schools. The very real digital divide between community schools and private schools (Acharya, 2015) means that any researchers would face numerous difficulties similar to mine in accessing rural schools. This situation compelled me to travel directly to the DEOs, NGOs and local schools in different districts to find the right sample schools. Besides these initial challenges, there were other unexpected challenges, such as cultural and language differences, field trips that involved going beyond information provided by Google maps, awkward transportation, and climate and weather. Even though I am Nepali, I was challenged by these problems in travelling through rural Nepal and in approaching appropriate authorities.

Modes of Approach

Like many other emerging researchers, I set out to the field with a research design I had developed with my supervisors while still in the university. I found that the reality in the research field was not what I expected while preparing my research proposal. I knew I would have to find and work with a *gatekeeper* or *bridge* to get permission to

contact schools, but the task was more difficult than I had expected. I found myself in a situation like that which Riaz (2013) experienced during her PhD fieldwork when the predetermined gatekeeper did not work, and the researcher had to look for alternative ways to access the field.

When I landed on the research ground of Nepal, I had a pre-planned strategy to approach the schools I needed. In the week following arrival in Nepal, the journey to my selected districts started with preparing a backpack containing basic items like my laptop, voice recorder, camera, camera stand, chargers, and so on. I made my way to the first and nearest school in a village in Lalitpur district, with plans of how to introduce the project to the head teacher and other teachers, how to schedule for interviews with the participant teachers and how to start class observations. Living nearby to the school would make it easier to travel to the school every day and I hoped it would be possible to manage to live with local families with the help of teachers in village.

When I reached the school, I introduced myself to the deputy head teacher in the absence of head teacher and explained the purpose of my visit. The deputy head teacher replied that he did not know anything about ICT practice in his school although he had been teaching there for six years. The school had been selected from the website of the funding organisation, which works with the Department of Education under the Ministry of Education. It was my very first experience of undertaking research in a rural setting of Nepal. Realising, as Hurrel (2005) and Yin (1994) suggested, the need to be prepared to establish new relationships, after returning from this first school I cancelled another pre-planned trip to a school in another district. I realised I had to strategically modify my plan to directly go to schools in remote villages, and I decided that seeking relatives around the communities would be a better way of approaching the schools. To some extent, this strategy did help me find out the reality of ICT use in the primary schools of another targeted district, and I changed my previous plan of visiting the second targeted school after communicating with relatives and their colleagues.

However, I was still looking for a better way of reaching the right schools. It seemed that the only option was to either visit a ministry body or a funding organisation. I emailed government and other organisation offices before visiting them to obtain

school contact information, I followed the example of Riaz (2013) by emailing with detailed information about my research project, and I also tried to reach them through office telephones. The phone communication did not work. All the emails were declined. What had seemed to be the best option turned out to be ineffective. Thus, the first month of my data collection period passed away in despair. Okumus, Altinay and Roper (2007) noted that no matter how well the researcher is prepared, there will be "several associated variables with gaining access which are out of the researcher's control". It became a real challenge in rural Nepal. Ultimately after a month of consistent struggle to find sample schools, I sought the help of a renowned social worker in Nepal who I had met once before. He sent a strong email that helped me reach one of the non-governmental organisations which has been working with the Department of Education to transform the traditional ways of teaching to involve e-learning.

Attitudes towards Research

A further struggle I experienced was with the attitude of the gatekeepers I encountered. Johl and Renganathan (2009) explained that a gatekeeper might be a person or organisation: I needed to deal with both. I kept in my mind that, as Brown (2009) emphasised, a researcher should be "polite, humble, respectful, punctual, patient, good looking and non-judgemental". On the other hand, I reflected that a researcher may well expect general help from others: like conversation, suggestions, advice, encouragement, and support on the research journey. I found that I was looking for this kind of support to move my research project forward. However, I began to think it was futile to hope for support and co-operation within a context where there was little internal history of research and where there was not a culture of valuing academic research. When I visited various government offices and other organisations, very few officials seemed to see value in my research plan for Nepal. Most of the officials refused even to provide time for a short conversation; instead they would say things like: *I've a meeting at the time on the day*. Some said: *This is good, but I have to get permission from a higher level.* The most disappointing comment I would receive was: *We've nothing to do with this*.

Although there were notable exceptions, particularly with the schools that finally became part of my project, I had similar experiences in many schools in the course of

contacting them to gain access. I reflected that this aligned with accounts I came across in my readings, such as the experience of Laurila (1997) who found opposition from gatekeepers when there was a perceived conflict of interest, and that of Hasselberg (2015) who experienced frustration when she was initially unable to find the right means to express her point of view, share her concerns and get peer support to access her research field in a deportation centre in the UK. Considering Laurila's experience, I wondered that if the gatekeepers and I had different interests which prevented them from providing me with access to the teachers.

When I obtained the contact details of a number of schools from an NGO supporting the community schools, I was able to contact head teachers directly on their mobile phones. After listening to a brief description of my research plan, most of the head teachers' response was: *Are you from INGO or NGO?* I wondered if they expected aid from me as such from an NGO, or if they had negative experiences with these organisations. They did not seem to understand the position of an independent researcher who was not part of a donor organisation. I became aware that Nepal still lacks a culture of research and academic reflection. However, it also turned out that there was possibility in working with the funding organisation itself: it helped me select sample schools, providing all the school contacts, and it did not interfere in my research process, although in the beginning I had worried that they might.

I entered the field aware that respect was one of the first principles for a researcher to observe. Brown (2009) discussed respect in terms of researchers being professional, and understanding that they need to observe an *off-duty* code: to forget whoever they usually are in their organisation or profession. However, ways of respecting others may vary from one community to another, especially if there is a cultural difference. Thus, culturally dissimilar ways of showing respect is one of the challenges for novice researchers and entering the field is an initiative that puts heavy stress on cultural awareness. Although I am Nepali, there are many cultural differences in my country. In my research project, I faced difficulty in communication in the far-western region of Nepal because of different local dialects of the national language. Although the teachers would speak a standard variety with me, it was difficult for me to understand their normal communication with the students, local people and colleagues.

I also faced challenges from the culture of bureaucracy. For example, when I visited an education organisation's office to request access to schools, the office receptionist said, "Sir is very busy. You have to book his time." I acknowledged it was right to schedule time, but officials in Nepal rarely reply to emails. In my case, they had not replied to any of my emails. The office receptionist would give me repeated excuses: "I informed sir." "I told him, but did he not contact you?" "I will talk to him and inform you." When I asked to visit the office myself and see him, she would say, "I can't say anything. When he replies to your email, then you can see him." I wondered if there was a communication problem between the receptionist and her boss or intentional refusal of my request. I recalled that Widding (2012), from his experience in a Swedish context, suggested that the researcher needs to take a rational decision to get access in one of two ways – by consensus or by invoking a conflict. I reflected that perhaps there was now a need to show power, which I had never wanted to do. Therefore, I requested one of the senior social workers in the country to write an email to the director of the organisation, and that immediately worked for me. Although I did not anticipate it, the director of the organisation replied to my email immediately after receiving an email from the senior social worker. That opened my door to the research field. I reflected afterwards that hierarchical status is very well established in the bureaucratic culture in Nepal: the higher post officials may neglect ordinary people, but they immediately open the door of their office to someone who comes with the backing of someone with still higher authority.

Fear of Disclosing Information

My textbooks told me that all the researchers should abide by the principles of human ethics, but generally this is only evident in practice where there is an established tradition of academic research. When doing a doctorate a researcher needs to get ethical approval from the university committee to conduct the research, and that involves an explanation of the research procedure and of what the researcher is going to do with the information gathered. However, in some contexts, it may be less effective to show the information sheet to proposed participants or even to explain the research activities in detail to them. I found that was the case in Nepal, where there is no educational research council, and the research culture is underdeveloped. As Bista (2004) points out, the education sector in Nepal lacks broad and in-depth studies on persistent problems. When educated people have a good understanding of research

and its benefits, they are likely to support the researcher or at least to encourage the research. It does not mean there are not good academics and supporters in Nepal but the research culture in institutions is yet to be developed. I found that from questions that arose as I approached participants. For instance, even after reading the information sheet that the university had approved and receiving a full verbal explanation from me the head teachers would ask: "What do you want from us?" "Do we have to get permission from DEO?" "Do you think this is risky in our job?" "Can I ask the teachers if they are happy to participate?" "What will you do after taking information from us?" Following their questions, I re-assured them that their anonymity would be fully maintained, although the information they gave me would appear in my thesis and might also be used in other writing.

Even the participant teachers were scared of speaking the truth in the beginning days although they gradually became more confident. In this situation, I reflected on the importance of Brahler (2012) and Laurila's (1997) emphasis of the need for maintaining a relationship with the participants and getting their trust. Although I frequently explained to teachers that their information was confidential, they would initially hesitate to talk about the realities of their context and practices. They would say things like: "It's not allowed to say NGOs funding for the lab was used for other purposes." "I can't say his name but [D2] never takes students in the lab." "If I say [T1] finished two-day training in four hours, asked us to sign our attendance for two days and distributed the allowance, he will finish me from my job." Here, the ethical principles had to be re-explained, emphasising that their names and schools are not going to be published in any publications. I found that it was a challenge for the researcher to adapt well into the local community and get sufficient real information from participants. To win the heart and trust of participants is perhaps a bigger challenge than any other issues. Okumus et al. (2007) stressed that the researcher's personality and skills, as well as the organisational mechanisms, influence how access will be gained and maintained. Laurila (1997) suggested that getting involved in different cultural and social events with the participants can ease the relationship with the participants throughout the data collection. I tried to do that whenever I stayed in a rural community.

Compensation for Support

When I had been visiting the office of one of the organisations repeatedly, one of the junior staff members shared his own bitter feeling with me, saying, "They help where they get something." I became aware that many officials and some schools expected me to either pay them for supporting my research or give them some other benefit. The situation could be very costly for an independent researcher like me if there was always a demand for money in order to access the sample schools. I recalled that Fjellström and Guttormsen (2016) defined 'access' not just as a physical approach or as a tacit relationship with participants or communication with different organisations, but rather they considered it as an activity within a cultural context, a socio-cultural phenomenon.

Although some of the schools I approached initially looked for some form of benefit for their schools hoping I was representing an INGO or NGO, the head teachers of the schools that became part of my study supported me in every way they could, and freely, during my stay in the schools. However, I had to give up one of the schools I had selected because of their expectation of a financial benefit. Although it was not the only reason for leaving the school after being there a week, I was worried by their demand that I should make a contribution to their school, and although I succeeded in explaining that I was not working for an NGO and not in a position to make payments the confusion in expectations did indirectly influence our relationship and the process of trying to gather data. I recalled that Johl and Renganathan (2009) suggested that a researcher has someone from the community for support in establishing a relationship with the participants and to tactically deal with the head teachers and other teachers in the schools. I noted that Brown (2009) discussed the importance of researchers avoiding negative words. I found that saying 'No' to participants' requests led to a lack of support from them during the data collection. I reflected that this process of convincing participants who were used to receiving benefits from NGOs was a very complicated one. However, although dealing with administration was complicated, the rural village people I met were always supportive, pleasant, kind, accommodating, responsive and sharing. The teachers who finally became participants all fully supported me throughout the research activities in their schools.

Cultural Differences and Language Barriers

Although it is a small country Nepal has a broad range of socio-cultural, linguistic, religious and topographic diversities. Out of total land area 147,181 square kilometres the Himalaya region occupies 23%, the Hilly region 60% and the Terai region 17%. When we see the distribution of population as reported in 2011, that in the Terai constitutes 50.27%, in the Hills 43% and in the Himalaya 6.73% of the total population (Central Bureau of Statistics, 2011; published 2012 November). The CBS census report stated that about 80% of the total population live in rural areas whereas only 20% reside in cities. The report of diversity of languages and ethnic communities may seem very strange to rest of the world who might see Nepal as a small homogenous country. The census reported 125 ethnic communities and 123 languages spoken as a mother tongue. Nepali, which is the national language and is spoken as the mother tongue by 44.6% of the total population, also has various dialects in different regions. For me, it was one of the challenges of communicating with local people in the far-western region of Nepal where there are at least three dialects in the same district. When the teachers would speak with me, they would use an official variety of Nepali, but when they spoke with colleagues or in the classroom they would use a local dialect and it was difficult for me to completely follow the conversations. It also increased the difficulty in my effort to fit into local communities because the local people found it difficult to speak in an official variety of Nepali language; mostly they are not highly educated and had not gone to high schools where the formal variety was learned. Sometimes I had to guess what they were saying and find ways to reply that would make sense. Our struggles to understand each other became a way of learning the local dialect and that in turn helped me a lot in adapting to the culture of the village.

Generally, in the villages in Nepal, everybody knows all the others in their area. When they see someone strange, they tend to want to get a simple introduction to the person. However, this is highly gender specific, as males are likely to have a conversation, but the females avoid speaking with a stranger. I found that overall people would communicate with strangers when the strangers initiated the exchange. However, I was cautious about smiling at the females if they did not already know me, as I was aware it might be culturally offensive. In this context, I recalled several researchers' experiences (Brown, 2009; Darling, 2014; Okumus et al., 2007; Riaz,

2013; Widding, 2012) which suggested the need to exercise flexibility and reflexivity while entering the research field. For example, Subedi (2006) completed high school in Nepal and studied higher education in the USA but also experienced the need to re-negotiate the basis of interaction between researcher and participants when entering the field to do fieldwork. As I gradually learned their culture, I started to enjoy the days with the local people. However, it was a huge challenge to learn participants' culture and work with research activities simultaneously.

From the religious point of view, most of the community people believe in nature although they have faith in Hinduism and Buddhism. In the villages, people do not have a routine to go to the temples for prayer, as temples are rare. They believe in work and duty as their god. They are liberal, faithful, sincere, honest, dutiful and cooperative. I regarded it as a major challenge for me as well as other researchers to learn the local culture at the very early stage of working in the field. I recalled Hennink, Hutter and Bailey's (2010) suggestion that researchers should situate themselves within the local framework in order to be familiar with the culture, rather than merely searching for universal principles or meaning.

Field Trips beyond the Google Map

I found that *Google Map* was the only way to locate the areas for my research as this was my first visit into those particular rural regions. However, Nepal is a developing country in the field of technology. There has been a rapid increase in the use of modern gadgets and mobile data to access online information and in the use of social networking sites. People do update their locations on Google Map, which is helpful in finding different places in the country. But the geographical structure of the country is very diversified in nature which makes Nepal different than any other part of the world. The global positioning system (GPS) is at a very preliminary stage in Nepal although satellite views estimate the distance and position of different locations. When someone is travelling to various remote villages, Google Map provides limited information but is better than having nothing in hand to plan the journey. It provided me with information about how to get somewhere physically.

When I used the Google Map to make a tentative travel plan to reach the research field, it located the destination inaccurately in the mountains although it worked more

reliably in *Terai* regions (the plains). For instance, my very first travel to a targeted village school in one of the neighbouring districts of Kathmandu was planned by using Google Map. It took about three hours of local travel to the bottom of the hills, and then one and half hours of walking up to the school on the top of the hills. The irregular transportation service on the rough windy road forced me to walk up and down to the bottom of the hills through dense forest. When I lost the rough walking track in the forest, I dragged my body, sliding down and hanging on to the branches of trees. There would have been no help if something bad happened in the national park. However, I reached the bottom of the hills where there was a bus stop, with a lot of bruises and scratches on my arms, face and legs.

The Google Map was useless when I travelled to one of the mountainous districts in the far-western region for data collection. However, one of my university classmates from that district communicated with his relatives and then with some of the people he knew well in the area. At the same time, the head teacher and one of his teachers of the sample school frequently communicated with me on the way and that helped me find their village. It took about 36 hours from Kathmandu to reach the destination on a bus. I reflected that it was an even more complicated physical access than that described by Fjellström and Guttormsen (2016) in their somewhat similar Scandinavian fieldwork experience where they needed to access the field over high hills rising over 3000 meters altitude to reach villages on the very steep slopes. The topography complicates the location of any place found on the satellite view of Google Map. For example, when I found the sample school and arranged a living place in the village, Google Map showed a 15-minute walk down the hill, but the real on-foot journey took 30 minutes to the school, and it took about one hour to walk back to the residence up on the high hill. Similar differences arise in most of the hilly and mountainous regions of Nepal.

Transportation, Climate and Weather

The most feasible means of travelling to rural areas in Nepal is a bus. Most of the roads in hilly and mountainous regions are rough and narrow. Reports of road accidents are common in daily newspapers. The climate is very different in Terai, where it is moderate in the hills and very cold in the mountains. Weather changes depend on climate and season. However, winter and monsoon are more extreme than

spring and autumn in Nepal. In this situation, Aryal (2016), a researcher for *Save the Children*, suggested that researchers should reconsider the plan in terms of weather every time they travel to a research field in the hilly and mountain regions. Most of the travel routes to hills and mountains go through Terai which is very chaotic for any traveller. The only highway that runs from east to west through Terai connects several district roads in the hills and mountains in the North. When I had to travel for the first time to one of the mountainous districts to the North-west from Kathmandu, the capital city, it took me about 36 hours of continuous journey to reach the destination by bus.

I selected a school from such a remote district for two reasons: firstly, the region had been relatively unaffected by the 2015 earthquake and secondly, there was an absence of research in mountainous and isolated rural areas (Sæbø & Thapa, 2012). On this long journey, I experienced irregular stops, pickups and drop-offs of local passengers along the highway. Despite regulations and ticket booking counters at headquarters of districts or regions, it is common for many people to travel without advance bookings and just pay onboard, negotiating the fare with the conductors. Sometimes, the buses stop wherever they like and delay the travel. A further challenge of travelling in the mountains comes when there is a monsoon: the heavy rain causes landslides and floods that may detain the travellers somewhere along the road. Sometimes travellers run the risk of accidents due to such disasters.

Means of Communication and Electricity

There are two major service providers of telecommunication in Nepal – Nepal Telecom (NTC) which is a Government corporation and NCell which is a private company. NTC has landline telephone, cellular mobile and broadband internet services, whereas NCell has cellular mobile and 3G internet service in urban and most of the rural areas of Nepal. By mid-December 2014, the record of telephone users crossed 90% (Ktm2day, 2015). The record of internet subscribers crossed 50.11% of the total population in mid-July 2016 (Pokharel, 2016 August 7; retrieved 2017 September 1). The news also reported that about fifteen thousand new internet subscribers are connected to the web every day. The mid-August 2017 report showed that over 58.73% of the total population use internet (News24Nepal, 2017 September 1; retrieved 2017 September 11). However, over 83% land is occupied by high hills

and mountains (Central Bureau of Statistics, 2011; published 2012 November). The range of such network services does not cover very low or high levels of the land. These services are not highly reliable while travelling to high hills or mountains in Nepal. Most of the villages lack landline telephone, and the cellular phone is the only means of communication. When there is severe weather, the mobile network drops out. Therefore, most of the teachers and business people carry both NTC and NCell sim cards. The internet is rare in rural villages where NTC or other private telecommunication companies are uninterested in investing (Sæbø & Thapa, 2012). However, people use mobile data to open Facebook and other sites, which is a very expensive way of accessing online information for ordinary citizens who have no particular source of income.

Another major issue is a lack of electricity in rural villages and the unreliable supply of power (Sæbø & Thapa, 2012). Though Nepal is the second richest country in water resource in the world, most of the rural people live in the dark due to a lack of electricity. However, some people have small solar panels just to provide light in the night, and these are still quite expensive. It is also a major problem in the villages to adopt modern technologies in the schools for teaching and learning purposes. In some schools in remote villages in the mountains where I have been, the schools have been supported with high watt solar panels to run computer labs. One of the schools in my project in the mountains has got 3.0KW solar power to run their computer lab. I learned there were 43 primary schools in that mountainous district that have solar or alternative energy to run digital devices for teaching and learning. Out of them, I selected one for my project. In an environment where there is a lack of the internet and unreliable phone service, I found that accessing the research field and further maintaining the access was a complicated job for me as a researcher, irrespective of the original research plan.

My Experience as Illustration of the Context of this Project

Looking back, I am aware that the difficulties I experienced in entering the field serve as an illustration of the nature of the context in which my project took place. The complexities in the field came from local administrative structures and practices, from the challenging geography and diversity of cultures, from the lack of communication resources in rural areas and from the impact of the earthquake.

Initial access to the various information sources, organisations or informants takes time for every researcher. In this doctoral research fieldwork, I had to modify the initial plan due to 2015 earthquake in Nepal. Although I decided to consider the impact of the earthquake as a determining factor in the selection of schools, I did not want to limit my study to the affected zone where almost all schools were destroyed or partly damaged. Therefore, I decided to dare to travel to the far-western mountainous region where there was less damage but where only a few schools had been using digital technology in teaching and learning activities. I also travelled to mid-western regions in the Terai where the summer temperature was over 40°C. In addition, I later added teachers from two additional schools in the zone highly affected by the earthquake in order to explore their previous experience of using ICT and their experience of the earthquake and their loss of ICT infrastructures in the quake.

While accessing these schools and the teachers who would become participants, I had to struggle in ways which I had not been able to identify in advance. In the absence of an educational research council in Nepal, I visited the DEOs and later several non-governmental organisations to get information about schools. While approaching these bodies, I experienced frustration and distress. My repeated emails, phone calls and in-person visits to the organisation's office were completely unsuccessful for about one month. Then a supportive email from an influential friend opened the gate to get contact details of schools in Nepal that were being supported in the use of ICT. That email thus opened the door or my physical access into the field.

Afterwards, there were further unexpected challenges experienced while travelling to the schools I selected for my project. These challenges included the travel distances which considerably exceeded what I had planned through Google Map, irregular transportation services and erratic bus fares, poor mobile networks, lack of internet, and cultural and language differences. My difficulties in accessing the field may serve as an introduction to the context of Nepal for readers of this thesis.

Physical access to the field was one of the major challenges in this study as I selected schools from different regions such as the Terai, the hills and the mountains from

central development region to far-western development region. The landscape of Nepal rises from the south (the Terai) to the north (the mountains). The climate in the Terai is very hot, moderate in the hills and very cold in the mountains. However, it changes when the season changes. Travelling to the hills and mountains was complicated because the majority of the roads in the high range areas are rough, and the use of Google Map to locate the places and route to travel to the places would not work in the high rising hills, therefore, I had to travel in a bus over 36 hours from the capital city Kathmandu to far-western development region.

When accessing the field for the study in rural Nepal, I had to rely on a mobile phone which was not highly reliable in the mountains. NTC owned by the government and NCell, the private company, are the main telecommunication service providers which connect over 90% of the total population of Nepal. Although the recent report shows that internet users crossed 58.72% of the total population of Nepal in the mid-2017, the internet is not easily available everywhere, mobile data is costly and the culture of using internet as one of the major means of communication is not well developed. Beside, I experienced that the unreliable electricity supply in the towns or cities would hamper data collection. And the majority of people in rural villages either live in dark or use small solar pannels to get light in the house instead of traditional kerosene lamps. One of my study schools in the mountains had 3.0KW solar power to run the computer lab where there was no electricity transmission line.

The diverse communities of Nepal consist of 123 languages and 125 ethnic communities. Nepali as a national as well as official language alone has several dialects particularly in far-western region where I had been for my study. I could hardly understand about 10% of the people's conversation in the locality which was one of the initial challenges for me to proceed the data collection. However, my participants could speak both standard and local varieties of Nepali. Besides, there are typical traditional cultural values in different ethnic communities. For instance, women would not entertain a stranger's smile in many ethnic societies similar to the village in the mountains where I spent over a month. However, the people in rural villages are honest, humble, respectful, kind and supportive who believe in work as

god or goddess. It is very unlikely to find any religious temples in rural villages where the people live in peace and harmony. In the families, children go to schools, parents either look after cattles or work in their agricultural farms. Particularly females care house chores and males engage in income generating works. Generally, senior adults gather in *Chaupari/Chautari*[7] or *pasal*[8] and share their views along with *chiya*[9] or *raksi*[10] which is a kind of tradition in villages.

In the process of approaching the participants, I realised that the research culture is underdeveloped in education field in Nepal. For instance, the head teachers of my study schools would raise and repeat their questions regarding risks of their participation in this study even if I explained the concept of research and ethical values. In that situation, I had to re-assure that their every kind of information would be highly confidential. In some cases, I needed to give some time more and re-explain the entire study activities to get consent form signed and to proceed the data collection. But, it is only one of further steps like building a relationship and maintaining the relationship till the end. However, I got full support from them during the field work.

Although I had never considered needing to offer *compensation*, I became aware of the expectation when a front desk staff of an organisation said: "They help where they get something". In several other meetings the suggestion was implied rather than verbally expressed. It made me aware that if that situation came to me to pay money for supporting me in my study, it would be very costly for me. Some head teachers who I initially contacted over the phones and who declined expected some kind of benefit for supporting me. However, the head teachers and their teachers who involved in my study supported me in every way they could do.

I have offered this detailed account of my experiences of entering the field as a means of leading readers into the field and helping them understand the differences between rural Nepal and the contexts they live and work in.

[7] Resting place beside street where there is normally a big tree
[8] Local shop
[9] Tea
[10] Local homemade alcohol

Chapter IV: Methodology

Introduction

This chapter presents the research methodology and design of this study. The purpose of this study is to find out how ICT is being integrated into education in rural primary schools in Nepal. ICT in education in Nepal is still under-researched, therefore this study is needed to inform future policy and practice through the investigation of both historical and current documentation of curriculum intentions and government initiatives and the observation of rural practices and interviews with sixteen rural teachers. Archival documents, reports of policies and acts, are used to explore the history of policy and its implementation. An extensive review of Nepal's acts and policies is presented in Chapter V. These documents provide a base for the development of an inquiry framework for this study.

An approach that priorities context provides the research framework. Accordingly, a large part of this study focuses on rural primary school teachers' reported perceptions of the use of digital technology in their instructional activities and uses these to interpret their experiences, intentions and challenges. The study also reports observation of the teachers' practices of digital technologies in their teaching activities.

This chapter describes the qualitative methodological approach, particularly explaining methods for obtaining information, the process of data analysis used in this study and explains decisions made about reporting findings.

Qualitative Research

This study is qualitative in its approach as it is context sensitive and interpretive in nature. This allows exploration of participants' understanding of ICT, their experiences and classroom activities through interviews and observations (Neuman, 2006). I spent two weeks with the participants from two schools and at least four weeks with other participants from three other schools and held conversations in several sittings about the issues reported in this study as they evolved. This allowed me to obtain socially and contextually meaningful information in natural environment which researchers (Denzin & Lincoln, 2011; Sherman & Webb, 1988) have suggested is critical.

Sherman and Webb (1988) explained that qualitative research focuses on natural settings. Similarly, Lincoln and Guba (1985, p. 227) described qualitative research as *naturalistic inquiry* in which nothing is predefined; rather events evolve in the context progressively. I travelled to the rural villages, explored the complicated and only partly mapped pathways to the schools I have included in this study, spent several weeks with the teachers and the children, and gathered details about the social and educational information as it evolved in discussions and observations in the natural setting. I have attempted to interpret the participants' information and my observation notes contextually, as suggested by Denzin and Lincoln (2011, p. 564). Therefore, setting is important in this study and is the basis from which to interpret the rural context of the schools and the discourses held with participants.

Interpretive Paradigm

As the study follows an interpretive paradigm, I described and examined the lived experiences (Kinash, 2013) of participants in the natural environment of their rural schools, particularly their ICT labs. I also report their experiences of training programmes, their access to ICT and internet in their villages and their experiences of the 2015 earthquakes. In addition, I initially base my analytic interpretations of the data I gathered on the meanings given by the participants themselves rather than on theories developed in the literature that reports western research about the use of ICT in education. However, as the following chapters show, government policy documents do base their rationale for the use of ICT in schools on concepts developed in global contexts, and, therefore, I refer to international writings in order to contrast the differences in context and resources between what is discussed in international literature and what is the lived experiences in rural schools in Nepal.

In order to ensure rich data is gathered, as suggested by Denzin and Lincoln (2011), I have put primary focus on policy documents and official reports as well as the teaching activities of the teachers with the digital devices in the lab, students' behaviour in the participants' classes and teachers accounts of their training experiences and of their expectations of how to use ICT. I gathered field information through semi-structured interviews and observations in the context where the rural schools are situated. I intend to present constructions of meaning based on

participants' information about the use of ICT in their instructional activities and what actually I observe in the participants' classes as advised by Walliman (2001).

Walliman (2001) asserted that, when doing a qualitative study and working in natural settings, it is important to employ more than one method to capture the moments because the social reality is constantly changing. To track the fluid and dynamic reality of the teachers' ICT use in their instructional activities, I held semi-structured interviews with the participants and observed their digital technology practices in a real context, as suggested by Cohen, Manion and Morrison (2007). From gathering to examining the qualitative information obtained through the interviews and observations, as advised by Denzin and Lincoln (2011), an inductive process was used rather than following a predetermined hypothesis.

Sociocultural Approach to Research

As this study is based on a natural setting, I entered the field with an idea about what I was going to do but open to emerging ideas. Although I have a general idea of Nepal's socio-cultural diversities, it was essential for me to learn to understand the social background of the participant rural schools because there are 123 indigenous languages, excluding dialects, and 126 ethnic communities in Nepal. Because I wanted to be considered as a co-worker rather than an external investigator and to allow participants to freely share their ideas with me (Mahn, 1999), I initiated my field activities by trying to become a member of the teachers' group in the school. For example, I supported the teachers to carry heavy logs, transfer benches from one room to another, and conduct various curricular activities. Also I covered their classes in their absence. I was aware that social contexts and cultural values are closely interrelated with participants' understanding, values and ways of doing (Wertsch, 1993). Therefore, I first learned to be part of my participants' short trips, social events, visits to local tea shops and lunch. This approach allowed me to amass thick description relevant to my study.

During interviews or open conversations with the participants, I was careful about my conversational activities with the participants, language and presence in front of them in their setting because these things, as Lasky (2005) described, may influence the participants. I intended to allow the participants to speak freely and honestly about their experiences of using ICT in their instructional activities and kept in mind that

their understanding of their teaching experiences are inseparable from social contexts. This approach provided flexibility to observe the teachers' practices of ICT in natural settings, to examine what Mahn (1999) calls the interaction of the natural, individual and social forces leading to participants' understanding, values and experiences. John-Steiner and Mahn (1996) emphasised the importance of exploring the participants' behaviours, intention and progress. Simultaneously, observation supported the identification of ICT as a part of pedagogy and led to gather teachers' perceptions about ICT and its application.

Case Study

Denzin and Lincoln (2011, p. 170) stated that a case study is an "intensive analysis of an individual unit" that is oriented to "more detail, richness, completeness and variance which is depth for the choice unit of study". The case in this study is the use of ICT for instruction in rural primary schools in Nepal. Accordingly, I studied the schools' contexts, the teachers in those schools, their ICT practices and their understanding of the potential of ICT and of their use of it, as well as the wider framework of Nepali educational policy and acts that have created the environment in which ICT is encouraged in education and the relationship of NGOs with provision of ICT resources in training in how to use them.

Denzin and Lincoln (2011) emphasised that a case study focuses on the environment, that is, '*context*' as the case occurs in a specific place in a certain time. Therefore, I focused on the teachers' activities, expressions about their experiences and perceptions, student behaviour at some level, and natural setting (Lichtman, 2013) of both village schools and national policy development and (non-)implementation.

This study can be considered as a single embedded case study (Yin, 2009). The impact of the major earthquake on Nepal influenced the direction of this study and the decisions about choice of schools. Post-earthquake, I intended to study three cases in three different schools, selected on the criteria of the April 2015 Earthquake impact on the use of ICT. With that plan, the first school was expected to be in the highly earthquake-affected environment, the second case in partly affected context and the third case in the environment where the school was surviving without the influence of earthquake on ICT. However, two more schools were involved in my study during my field work due to the following reasons. One was a school that had initially used its

digital devices actively, but had stopped using them for the past two years. I was curious about their experiences and hoped the study of this school would add further dimensions to my case study. The second was a school in a mountainous district that was extensively using technology in teaching activities. I found as I travelled that many schools in the mountainous region were making extensive use of technology despite lack of web access and other topographical problems. I hoped that the study of one such school would also add useful data.

The Schools

I purposively selected and involved five Nepali rural primary schools in this study: Annapurna, Buddha, Chadani, Dhaulagiri and Ekata as I have named them to ensure confidentiality. Each school has its own context, characteristics and different sociocultural background because they are located in different regions or districts or villages.

Annapurna School, which lies in mid-western development region but in the Terai, was the last school visited in the study. After communication over the phone with the head teacher of the school, I travelled to the school by a bus from Kathmandu which took a full day. The school is in the middle of Banke National Park about two kilometres away from Mahendra Highway, the only highway running from east to west in the Terai and connecting the Hilly and Himalayan regions, although there are other short highways through the hills. When I reached the nearest small bazaar along the highway, I walked to the school along the rough road and, for about 45 minutes through the wild and somewhat scary national park full of wild animals such as tigers, leopards and elephants. The school is located in a peaceful place far from pollution and noise, in the middle of a village surrounded by dense forest. The panorama of a green paddy enhanced the beauty of the school. My on-going vivid recollection of the beautiful paintings on the walls of classrooms and curious children surrounding me during the lunch break always makes me nostalgic. I still feel as if I am there with children pulling tube-well lever to pull out underground water for drinking and flushing the loo.

Buddha School is located in far-western mountains where I spent over four weeks after I had been to Chadani School. I included Buddha School in my field work because it illustrated that even the schools in the mountains were using digital

technology in teaching activities. It took me about 36 hours by bus to reach the village through the Terai, the hills and the mountains. I had really beautiful experiences living in this different community where the people speak a different dialect of Nepali language. I could initially only understand about 10% of their language, but they understood my language which is the official variety. The teachers spoke the official variety with me but used their local dialect among themselves. During the month I was there, I learned their language quickly and was able to understand approximately 50% by the time I left the village. I had another memorable experience of walking down the hill to go to the school early morning, viewing the sunrise, capturing scenic views into my camera and watching children on the school ground. Friendly teachers, curious children asking me questions about city life, several short trips around the village, social events and dinner with teachers are some of the unforgettable experiences from this school.

Chadani School is special for me as it was where I started my actual fieldwork. It is the second nearest school to the capital city. So, I could catch a bus that took about three hours to the school and the same distance back to the city. I chose this school because it is in the disaster zone and was partly affected by the April 2015 earthquakes. I spent over five weeks in this school, became a member of the teachers' team, covered vacant classes in the absence of teachers and learned how to adjust myself in new communities. The bilingual nature of the community and children in this school enabled my familiarisation with a context I could perhaps expect at the other schools. The school was established by a Japanese in mid-80s particularly targeting a marginalised ethnic community where almost all the people were illiterate at that time. Later it was funded by the Government of Nepal. After I had stepped into this school, the teachers always involved me in every event or activity in the school such as prize distribution and sports. I still remember how I unloaded and carried heavy gabion nets, logs and iron pillars used for rebuilding earthquake damaged buildings from the truck with the teachers.

Dhaulagiri School is situated in the hills of the central development region, which was the major earthquake crisis zone. This was one of the schools that were substantially affected by the April 2015 earthquake and it lost all the buildings and computer lab. It took me about four hours on a bus from the capital city and another hour on foot to

reach the school on a high hill slope. In the middle of the monsoon, I arrived at the school one year after the earthquake. I could hardly see one new house in the whole village and the majority of the people were still living in temporary shelters made from tin roofs. I was happy that the school had new classrooms rebuilt but sad that the teachers continued risking their lives under a ruptured one-storey building which had an *unsafe* sign on it, placed by the government. My two weeks with the teachers in this village became an opportunity for understanding some of the level of pain of the earthquake. The taste of fresh jackfruit I had with head teacher and others in the school is still in my mind. Anybody could have a heavenly feeling when viewing the green valley, downhill river and highway to the China border along the river.

Ekata School is the nearest school to the capital city. It took me about two hours by bus to reach the school from the capital city. When I reached the school, the beautiful pine forest that surrounded the school and a small lake in front of the school enticed me. I spent two weeks in this school. I included this school during my field work because the school had a *One Laptop Per Child* project running for about five years which provided each child with a digital device to carry with them wherever they would like to. But the school collected all the devices from the children, developed a lab of 30 devices and returned other devices to the NGO which supported the school with the technology. Unfortunately, I found that the school kept those devices in the lab without using them for over two years.

Participants

In this study, I interviewed 16 primary teachers from the five rural primary schools described above and observed the classes of 12 of them. Those twelve participants were from Annapurna, Buddha and Chadani schools (four from each) which had computer labs. I interviewed them and observed their classes. Four participants were from Dhaulagiri and Ekata schools (2 teachers from each) were only interviewed. Dhaulagiri School lost its computer lab in the April 2015 earthquake, I only interviewed two teachers but could not observe their technology practice in their teaching activities. Ekata School was the school that had kept their technology devices in the lab without using them for over two years. The teachers from these schools were involved in this study because one research sub-questions concerned the earthquake impact on ICT use. The two participants from Ekata School were

interviewed to explore their experiences and perceptions about the use of digital technology.

The teachers I selected for the study were general teachers teaching various subjects in primary schools. In the selection of participants, I did not make particular criteria, for instance, subject-specific, teaching career, age, gender or something like that. The main purpose of the study was the only determining factor in deciding the participants in this study. However, the participants' teaching careers varied between three to 29-years of service. In the process of selecting the participants, the head teacher of each school became a mediator to organise an informal meeting with his teachers in the school. In the initial meeting, I explained about my project and asked for their voluntary participation. At the end of meeting, everyone was interested in becoming involved in this study but, without disappointing them, I then chose the numbers of participants that I had previously decided. In the following table, I present the list of all the participants and their schools, their pseudonyms and their employment status. The importance of that status is further explained in Chapter V.

Table 4.1: Participant Schools and Teachers

School	Participant	Gender	Status
Annapurna School	Anuj	Male	Fix-term
”	Ananda	Male	Temporary
”	Anita	Female	Private
”	Asha	Female	Private
Buddha School	Binod	Male	Permanent
”	Bijen	Male	Permanent
”	Bhupal	Male	Permanent
”	Bikash	Male	Private
Chadani School	Chandra	Male	Temporary
”	Chiran	Male	Permanent
”	Chitra	Male	Temporary
”	Chetan	Male	Permanent
Dhaulagiri School	Deepa	Female	Temporary
”	Dinesh	Male	Temporary
Ekata School	Ekendra	Male	Private
”	Elisha	Female	Private

My Position in the Research

Before going to the actual field of this study, I carefully considered my role. In one way, it was obvious that I was an insider, and in other way an outsider. Because I was born and brought up in a similar community in Nepal, had a profound understanding of the way of life and also because I have been a teacher for over eighteen years in the same country, I considered myself in the position of an insider. On the other hand, a researcher may not know specific characteristics of the particular social context though he/she may have a general idea, and each setting is distinctive (Hellawell, 2006). In my case, I had never been to these particular schools and I did not know the participants before I actually visited the schools and met them. Because I did not have intimacy with the participants in this study prior to the study (Mercer, 2007), I was an outsider in that situation. It made it a challenge to flow in shifting my position from an outsider to an insider or vice versa as the participants and I built up a rapport during my field work.

Unluer (2012) pointed out that researchers who undertake qualitative research can have several roles such as researcher, friend, colleague, depending on the contexts, and, therefore, it is essential for them to clarify their roles. Kincheloe and Tobin (2006, p. 4) suggested a researcher needs to understand that socio-cultural values and ideologies are connected in real life and therefore he or she also becomes a part of the socio-cultural values of the research field. As a researcher, I had to decide which one of the above mentioned roles I would occupy. I needed to be cautious when taking a particular role because it would impact the development of participants' shared ideas, understanding and their way of acting. In the case of interviews, I occupied all the roles, but in classroom observation, my role was a researcher and colleague.

From the perspective of occupation, as a teacher for many years in similar cultural and linguistic background, I shared common ground with the participants. I spent my days in the schools as long as the participants worked in the school. In addition, I engaged myself with them in various social and cultural activities in their village when living in the community during the fieldwork and they treated me as a member of their community. It increased my intimacy with the participants and opened up a wider space for me to obtain rich information from them. They openly welcomed me in their classes and asked for feedback on their teaching activities. However, I tried to

strategically divert their requests for my feedback to keep my study free from involuntary influences. My background as a teacher allowed me to be a member of their classrooms too. I sometimes taught their classes when they were absent as the head teacher frequently requested me to fulfil the vacant classes. I became not only a researcher but also a teacher in those schools. From this lens, my position seems to be an insider. However, I was also recording the contexts and teachers' teaching activities in my diary. In this sense, my position is an outsider.

In qualitative research, I reflected that being an insider has advantages in deciding the case, accessing the field, introducing the role of researcher to the participants and surviving in the field (Unluer, 2012). However, there may arise questions about how to avoid bias, dual roles and obtaining and reporting sensitive information. In my case, I carefully considered my ethical obligations, such as maintaining social respect for the participants when interviewing them and anonymity in presenting their information.

Documentary Evidence

Documents are generally considered as historical records. They can be primary sources of data such as "manuscripts, charters, laws, archives of official minutes or records, files, letters, memoranda, memoirs, biography, official publications, wills, newspapers and magazines, maps, diagrams, catalogues, films, paintings, inscriptions, recordings, transcriptions, log books and research reports" (Cohen et al., 2007, p. 194). These sources can be the base of the research as the literature. In my case, because this is a seminal study, they were part of my data.

In this study, I obtained a number of official documents from the websites of the Ministry of Education, Department of Education, Curriculum Development Center and National Center for Educational Development, Nepal. I also collected hard copy of Education Acts from bookstores in Kathmandu, Nepal. For general information about the schools and participants, I captured the information sheets displayed on the walls of the head teacher's office in every school with my camera. The head teachers were happy to provide general information as I assured them I would preserve the anonymity of the schools in using the information in this study. These documents supported me to critically investigate events, developments and experience of the past (Singh, 2006). The archival documents facilitated me to examine the participants'

experiences of ICT use in their teaching, their perception about the practice of the technologies and to contextualise my observations.

Interviews

As this study was based on an interpretive design, I determined to give a wide space for participants to express their views. However, the interaction between myself and participants took place with the purpose of the study in mind. This focus is extremely important (Kumar, 1999). I followed a process of semi-structured interviews, one of the flexible instruments for collecting data that allowed me to make use of "multi-sensory channels: verbal, nonverbal, spoken and heard" (Cohen et al., 2007, p. 349). Also, I was aware of the need for the interview to obtain accurate and profound information from the participants, as suggested by Newman and Benz (1998). An interview schedule which was prepared before travelling to the research field provided me with a guideline for interviewing the participants in the actual setting. However, I had several conversations with the participants on various occasions such as in local tea-shops, forest safaris, family invitations and festivals. These opportunities allowed me to gather thick description of local environment and the participants' ICT practices.

I recorded the interviews on an audio device with the permission of the participants. I tried not to take notes, to eliminate distractions that might occur if I tried note-taking and interviewing simultaneously. However, I sometimes noted important points to further lead our conversations and retain the feeling of a particular expression. I was aware that note-taking would impact the natural setting between myself and the interviewees. Therefore, my attention was on to how to lead the interviewees to express their deeper understandings and how to capture detailed information. I listened to the audio recordings of interviews several times, made notes and followed up with the participants to discuss issues further. This strategy allowed me to begin to analyse the information I gathered and to begin to develop tentative interpretations and conclusions.

Participant Observation

As this study was oriented to explore in-depth information about teachers' ICT practice, I set out some guidelines about what to observe in the teachers' classes in the

computer lab, as suggested by Cohen, Manion and Morrison (2011). Also the case focused on the environment of the schools. Hancock, Ockleford and Windridge (2007) emphasised the value of observations to complement interviews in research. They expressed doubt that what participants say might not be found in their behaviour. Some studies focus on triangulation as a means to evaluate and confirm the data obtained by different methods (Jick, 1979, pp. 602-611). But, in this study observation and interviews were not primarily used to triangulate the data. Rather an observation strategy provided me with opportunities for making my interviews with the participants more extensive and crystallising the information gathered through the interviews.

For obtaining detailed information, I spent several weeks in the participants' schools and sat in their teaching classes in the lab regularly to observe their classroom activities. I made reflective notes in my observation diary sitting in a rear corner of the lab when they taught children in the lab, and the strategy included observing the participants' body language during the interviews or further conversations (Kawulich, 2005). I observed at least seven classes for each participant in Annapurna, Buddha and Chadani schools and interviewed them. However, I was unable to observe the classes of other participants from Dhaulagiri and Ekata schools due to different reasons as mentioned above but only interviewed them. The observations of the participants' classes in the lab investigated how they used the digital technologies, what resources they had in the lab and particularly how they incorporated the technology in their teaching. I noted the participants' teaching activities in my observation diary when observing their instructional activities in the lab. I just sat in the corner of the lab with my laptop as other children did in the lab and noted the teachers' activities in my diary. But I did not interfere with the participants' classroom activities.

Transcribing Audio Recordings

When staying with the participants in the sites, I interviewed the participants more than once at several sittings and followed up the interviews by informal conversations. These discussions accumulated audio records of several hours with each of the sixteen participants. The interviews with the participants were conducted

in the Nepali language, the mother tongue of participants and mine, with the intention of eliciting in-depth information.

After the interviews, I needed to listen to the audios to explore the emerging themes and issues so that I could ask the participants further questions in the next opportunity. When I got some free time, I took the chance to transcribe the audios during the fieldwork. But, most of these audios were transcribed after returning from the sites. I found a challenge in transcribing qualitative information which raised a question of how to maintain the reality and represent the relationship between talk and meaning (Lapadat & Lindsay, 1999). Keeping Tilley (2003) in mind, I made the complexity of transcription visible by acknowledging how the reported data was constructed and the processes I followed in data treatment. Aware of the advice of Oliver, Serovich and Mason (2005), I transcribed interviews in a way that eliminated stutters and involuntary repetitions and rather retained the flow of the participants' expressions. Nevertheless, I sought to keep the flavour of their words as much as possible.

As I transcribed, I translated most of the interviews and further conversations into English. The translation of interview records was a vital part of processing the data. Therefore, I carefully listened to the audios several times when translating it into English to maintain accuracy and the meaning of the participants' responses. My senior supervisor's and doctoral fellows' suggestions for re-reading the transcription and re-listening to the audios helped me maintain consistency in this task. At many places of my transcription, my friendly readers' suggestions in correcting the English language allowed the meaning to flow more accurately and smoothly.

Organising Observation Notes

It is a difficult task to analyse and report observations of the participants' classes, contexts where the cases occurred, and participants' classroom behaviours. In this study, I intended to provide broader information about the social context of digital technology, which Geertz, in the 70s, and Denzin, in the 80s, defined as thick description (Ponterotto, 2006) as well as reporting what the participants did with the technology in the computer lab. Therefore, I considered the natural setting of the cases along with the presentation of observational notes in the analysis. My field

journal consisted of my observations and reflections about participants' teaching atmosphere, technology infrastructure and classroom activities and my analysis involved further reflection on these records.

When analysing the field notes, I assembled all the notes that I made on different observations and constantly checked and rechecked what was in my diary. This allowed me to organise several elements in different groups and to develop argumentative reflection on the participants' comments.

Grounded Thematic Analysis

I used a process of grounded thematic analysis when analysing a wide range of information. Boyatzis (1998) explained thematic analysis as a strategy of encoding qualitative information into certain themes that are logically related. He defined a theme as an emerging pattern that maximally describes and interprets information. The patterns I identified came from what emerged in the context itself rather than from any themes drawn from literature. Therefore, I describe my process of thematic analysis as grounded. I considered grounded thematic analysis as a strategy that would enable me to organise a broad range of different information in a systematic way that would assure accuracy and sensitivity in understanding and interpreting interviews and observations about people and situations. This study follows interpretive analysis because it allows the researcher to analyse socially meaningful information gathered through semi-structured interviews and observations (Neuman, 2006).

Different specific themes were identified and information was classified under various themes by relating the commonalities (Mills, Eurepos & Elden, 2010). I coded field notes and interview transcripts and categorised further to major themes. When observing the natural setting in the schools, I obtained extensive information regarding the integration of digital technology in instructional activities, and various issues relating to the use of those technologies, obstacles and possibilities for the future. The non-formal dialogues and interviews discovered underpinning issues, problems and strengths of ICT integration in teaching and learning. I categorised the issues, problems and possibilities thematically and analysed critically regarding

Nepal's needs. I often used the existing literature as contrast. Nvivo 11, a computer programme, helped me organise all interview transcription under themes systematically.

Research Ethics

When designing the research proposal, I considered the advice of The British Psychological Society (2010) that research ethics as a vital moral principle that would guide my research from its inception through to completion and publication of results. Therefore, I followed standard university procedure to obtain ethical approval (Appendix A) from the Educational Research Human Ethics Committee (ERHEC) at the University of Canterbury before going to the research field.

For the consent of the participants' voluntary participation in this study, I supplied an information sheet (Appendix B) and consent form (Appendix C) for the head teachers of each school before meeting with the participants. Then, with the consent of the head teachers of the selected schools, I provided the participants with an information sheet (Appendix D) and a consent form (Appendix E) to sign. Also I verbally explained that their participation in this study was voluntary and the information provided by them would be confidential. The information sheet contained the purpose of the study, means of data collection and how the information would be used in this study. At the same time, I assured participants that anonymity would be maintained, and I gave them time to decide if they wished to participate in this study. When they provided a signed copy of the consent form, the study was followed by fieldwork. Although the head teachers and participants verbally allowed me to use their names and photos of the schools, of children in the school and of themselves, I considered that it could potentially be compromising for them at some future date and I have preserved their anonymity.

I am aware that ethical responsibility in research goes beyond gaining informed consent and guarantees of anonymity: it also includes treating participants and the information they give respectfully. I have sincerely tried to avoid biases in the presentation of participants' information. For this, I revisited the interviews and observation notes to maintain accuracy and meaning and I have emphasised the importance of their contextual situation.

Chapter V: Nepal's Education Policy in ICT and Teachers' Understanding of It

> ICT has been considered as an effective tool for educational transformation through improved teaching learning process making learning horizon wider. *(ICT in Education Master Plan – 2013, Ministry of Education, Nepal)*

Introduction

This study examines rural primary teachers' practice and understandings in regard to the use of ICT in education in Nepal. Because ICT is still a relatively new resource in education in Nepal, it is important to explain the intention and implementation of policy as well as reporting teachers' perceptions and practices. Moreover, as the context of Nepal, as indicated in Chapters I and III, is very different from that of western education systems, I will report the emergence and development of national policy in some detail. This historic review is necessary as there is a current lack of comprehensive accounts or critiques of educational development in Nepal and an understanding of the history is very important for understanding the complexities underlying current problems and practices. This chapter, therefore, focuses on the wider context of policy vision and plans for implementation in which the introduction of various kinds of ICT is played out. Because teachers are at the heart of school practice, I include comments from my participants about their understandings of policy and its consequent regulations.

This chapter starts with an account of the Government of Nepal's initiatives to modify educational policy and strategies in the school sector at the turn of the millennium. A key focus is the government's aim to transform teaching practices in primary school classrooms through the integration of educational technologies. I interweave this account with reports of what the in-service teachers I interviewed say about policy and its expectation that they will incorporate ICT in their teaching and learning plans and practice. This chapter examines processes of teacher recruitment and qualification, the development of ICT in education, curriculum and textbooks, the impact of increasing decentralisation of school management systems.

A Brief History of Curriculum and ICT in Educational Policy in Nepal

In order to explain the context of ICT development, I will briefly report aspects of policy development and change in Nepal since 1954. In 1954, the Nepal National Education Planning Commission (NNEPC) laid the foundation for a national education system with a vision for working towards 'national unity, democracy and development'. In 1962, the National Education Commission added 'nationalism' and 'political ideology' to the aims of the national education system (MoE, 2010a). The key intention was to add citizenship educations to the curriculum. Then a system of regional distribution was developed in accordance with the *National Education System Plan (NESP) 1971-76* which decentralised governance to the level of *panchayat*, village level governance. This policy opened the doors for non-governmental organisations to invest in the education sector in the 1980s and several international projects were established to improve access to and quality of school education (National Education Commission, 1992). Eventually, after 1992, the Government of Nepal agreed to adopt the *Education for All* policy, signed by many other countries as well, at the World Summit Thailand 1990 (*ibid*). The combined effect of the policies declared that education should be active in modernising society and in the development of its individual citizens.

In 2005, the *National Curriculum Framework for School Education* introduced "*ICT as a proven tool for educational transformation*" (MoES, 2005, p. 11). As part of the shift from monarchy to republican nationhood, in 2007 the *Interim Constitution of Nepal* declared basic education as a fundamental right, the quality of which was to be assured by the Government of Nepal (UNESCO, 2015a). The constitution also focused on ICT integration in teaching and learning in all the schools in the country (*ibid*). Subsequently, the *National Curriculum Framework for School Education in Nepal, 2007* also stated that ICT was to be used for communicating and transmitting information and as a tool for teaching other subjects, as well as developing the study of ICT as a distinct subject (MoES, 2007).

However, the later government document, *School Sector Reform Plan 2009-2015,* clearly stated that the government had not managed to fund ICT integration in teaching and learning although the earlier plan expected to integrate radio, ICT,

television to fulfil the needs of current learners (MoE, 2009). *ICT in Education Master Plan, 2013* reiterated the same plan of integrating ICT as a tool for instructional purposes (MoE, 2013). The recent official document *School Sector Development Plan, 2016-23* further detailed plans for integrating ICT in long-term goals for education in Nepal (MoE, 2016). It stated that the goal of ICT in education is to make the citizens skilful to work for the development of the country and integrate the country into the global community. The plan proposed an increase in ICT access to enable learners to participate in the fast growing technological world.

Qualified and devoted teachers are fundamental, as affirmed by (UNESCO, 2015a), for the implementation of any educational plan. Therefore in the next section I discuss the recruitment of teachers.

Recruitment of Teachers

Although Nepal has a policy for the recruitment of teachers (Teacher Service Commission), for some decades political issues have interfered with the process of licensing and placing teachers. One factor was that the Teacher Service Commission was unable to schedule examinations for the applicants. Another was that the government decided to make all temporary teachers in the schools permanent. This created tension between the new applicants and the re-designated temporary teachers. Without solving the problem, the amendment of the *Education Act, 2002* made provision for School Management Committees and the District Education Office to recruit more temporary teachers (Santwona Memorial Academy, 2012).

Teachers' Qualifications

According to policy, every teacher must be qualified in order to apply for a community school teacher post. To sit the teaching license examination, the *School Sector Reform Plan, 2009-15* stated that candidates must have higher secondary education [10+2] or an equivalent teacher preparation course to obtain a primary teaching license and Master in Education (M.Ed.) or equivalent to obtain a high school teaching license (MoE, 2009). Since *Education Rul*es, *1999* and *2002*, teacher education has become compulsory. The table below shows the qualifications of the participants in my study:

Table 5.1: Qualifications of the Study Participants

School	Participant	Qualification
Annapurna School	Anuj	Bachelors in Education (B.Ed.)
”	Ananda	High School plus two years in Education (10+2)
”	Anita	High School plus two years in Education (10+2)
”	Asha	Bachelors in Education (B.Ed.)
Buddha School	Binod	Bachelors in Education (B.Ed.)
”	Bijen	School Leaving Certificate (SLC)
”	Bhupal	High School plus two years in Education (10+2)
”	Bikash	Bachelors in Education (B.Ed.)
Chadani School	Chandra	Intermediate in Arts (I.A.)
”	Chiran	High School plus two years in Education (10+2)
”	Chitra	High School plus two years in Education (10+2)
”	Chetan	Intermediate in Arts (I.A.)
Dhaulagiri School	Deepa	Intermediate in Education (I.Ed.)
”	Dinesh	High School plus two years in Education (10+2)
Ekata School	Ekendra	Bachelors in Science (B.Sc.)
”	Elisha	Bachelors in Education (B.Ed.)

The participant teachers are from five sample schools in Nepal. The pseudonyms represent the schools and the teachers from each school. Some teachers have a Bachelors in Education, whereas a majority have only high school qualifications, with two years of teacher preparation added to the standard high school education (10+2). The sample in this table may be seen as roughly representative of teachers within rural schools across Nepal.

However, existing policies do not address how to develop ICT-skilled teachers for teaching with ICT in schools. Though the *National Curriculum Framework for School Education, 2005* introduced the objective of using ICT in teaching and learning (MoES, 2005) and the reformed *National Curriculum Framework for School Education, 2007* highlighted that the use of ICT in learning and teaching should be well defined (MoES, 2007), no budget was allocated, as stated above. The *School Sector Development Plan, 2016-23* again explained the strategy of integrating ICT in teaching and learning, but it did not outline an implementation plan (MoE, 2016). The

experiences of the teachers who participated in my study illustrate some of the ways in which rural teachers perceive the value of their teaching qualifications.

Teachers' Perception of Teacher Qualifications

The teachers I interviewed who had pre-service teacher qualifications talked about their sense of confidence in teaching. They explained that they had learned how to manage the classroom, motivate the children, deliver plans and evaluate the students' learning from their university course or teacher training. Anita from Annapurna School said:

> At the beginning, everyone feels uneasy to start. My previous one-year teaching was in nursery class which was helpful to understand the class. I know there are also teachers from another background than teacher education. All the teachers try to teach skills or contents, but teachers from a teacher education background have ideas of how to manage a classroom, motivate the learners, and various techniques of teaching.

Anita went on to explain that pre-service teacher training had made her feel ready to encourage meaningful learning rather than memorisation for the examination.

> There is always a question asked in the teacher service commission exam 'My students can solve every problem of the textbook but his marks in the exam are very low. Why? If you ask him/her right now, he/she will tell you everything.' My training helped me understand that's a kind of force for the students like 'he must learn.' So, the student learns everything from the book by force. That's not creative and practical learning. He cannot generalise his learning.

Here, the participant's explanation reflects her understanding, and that of policy, that the teacher education course provides knowledge of planning lessons, managing classroom resources and learning activities.

In support, other participants emphasised that the teachers must understand child psychology while teaching. Therefore, they must have the relevant preparatory qualification to teach. However, Bhupal from Buddha School who was a School Leaving Certificate (SLC) graduate (Year Ten), explained that his qualification was enough to be a primary school teacher in his time although it had become a requirement to have teaching qualification later. Therefore, he had to do two-year teacher education course to meet the policy standard. Another participant, Bijen who

was just an SLC graduate claimed that he had a sufficient level of knowledge, skills and capability to teach primary level courses although he lacked a teacher education qualification. He further explained that he developed his teaching skills from his in-service teacher training. However, he considered that those who have a teacher qualification do not need extra teacher training. Elisha from Ekata School argued that the teachers who are from teacher education have different ways of teaching than other teachers from commerce or science faculties. She pointed out differences in the delivery of plans in the classroom and claimed that qualified teachers engage the children in a wide range of activities and teach skills, but teachers from other background mostly deliver lectures. She pointed out some teachers in her school who forced the children to use their textbooks without involving them in collaborative learning activities. She said:

> I've seen that in this school too. They speak too much and ask the children to go through books. They even write the answer to questions on the blackboard. That's their way of teaching. There is less participation of children. They just give a lecture, give out notes and ask the children to memorise everything. This is a difference.

Her statement reflects that there are still many teachers from non-teacher education background in primary schools in Nepal, and that trained teachers see this as a concern.

Elisha further explained that she gained her knowledge of teaching strategies and learning principles from her university course though she considered that not all the theory could be employed in the classroom teaching. Another teacher, Binod, also explained that he did his Bachelors in Education (B.Ed.) after his first Bachelors in English literature because of the requirement of educational policy to be a teacher. He was not prepared to make a judgement about the usefulness of the training; he saw it simply as a matter of compliance.

These opinions indicate the various ways the teachers I interviewed perceived the importance of initial teacher education. My own professional experience of teaching in Nepal leads me to think that teachers across the country would echo this range of opinions. This suggests that, although Nepal has a policy asserting the need for teacher education, a lack of rigorous implementation reduces the development of a

sense of the value of initial training. Because of gaps in pre-service training, teacher professional development courses, like those run by the National Centre for Educational Development (NCED), are needed to provide in-service training.

ICT Training

Colleges of Education in universities responsible for delivering pre-service teacher training have a mandate to focus on the application of ICT (MoE, 2010b). However, none of the participants in this study had any training in the use of ICT in their teacher education course. This aligns with the findings of Dhakal and Pant (2015): that there is no specific course on ICT at Tribhuvan University, the oldest university in the country that teaches pedagogy. However, I learned that Kathmandu University covers the use of ICT in various subjects throughout master's degree courses. Other Computer Science courses exist, but these are too technical for general teachers. The lack of preparatory courses prevents the establishment of a solid foundation for the implementation of the government of Nepal's policy for ICT in school education.

Local Teachers in the Schools and Resulting Differences in Salaries

A further problem that became apparent in this study is the inconsistency with which teachers are appointed. In 2002, the *Education Rules* changed a centralised process of teacher deployment to one whereby the School Management Committee could appoint the head teacher and teachers in accordance with the rules of the District Education Office. However, the regulation provides flexibility for the school to recruit private staff. Since the regulation became active, five different category teachers have been found in the community schools (Khanal, 2011), as summarised in the table below.

Table 5.2: Categories of Teachers in Government Schools

Teacher categories	Characteristics
Permanent teacher	*Teachers appointed by Teacher Service Commission (TSC)* The TSC announces the vacancy for the eligible candidates with a teaching license, publishes a notice for the examination and schedules interviews. Appointees are provided standard government salary, annual increment, provident fund and pension.

Temporary teacher	*Teachers appointed to the permanent position by the School Management Committee* If the TSC is unable to recruit permanent teachers regularly, the School Management Committee (SMC) gets authority to recruit such temporary teachers who are provided full government salary but not the provident fund and pension. They can get promotion and study leave. The SMC has authority to transfer such teachers. They lose their job if a permanent teacher is appointed by the TSC.
Rahat teacher	*Teachers hired by the SMC to fixed-term government position* They are appointed for the fixed term by the SMC, but the government provides salary. They are not entitled to get provident fund and pensions.
PCF teacher	*Teachers appointed by the SMC on condition of Per Child Funding (PCF) budget scheme* The *Education Rules, 2002* created a funding for community schools on the basis of the number of students. The SMC appoints the teachers on a contractual basis and they generally hold the job as long as the school receives PCF scheme.
Local teacher	*Teachers appointed by the SMC on a local fund* When the schools have insufficient teachers in their schools, the SMCs have to manage the teachers within their local resources. Such teachers are generally low-paid and at a rate depending on the resource of the school.

One of the strategic aims behind making the SMC responsible for managing its local workforce was to transform education (MoE, 2009) on the basis of the expectation that local teachers living in their family would have the higher work efficiency and make a greater contribution to their local school.

However, Khanal (2011) claimed that the "grass-root management system", the system of devolution of responsibility to local level that came as the result of *Education Rules, 2002,* generated undesirable diversity among the teachers regarding their identity, status and facilities. He claimed that policy gave SMCs authority to manage temporary, relief quota, PCF and local teachers, with correspondingly varying salaries. Permanent, temporary and relief quota teachers were paid almost the same

salary but the other categories, PCF and local teachers, were generally low paid. The difference in pay impacts on teachers psychologically, socially and personally as illustrated below. However, *Education for All, 2001-2015* claimed that decentralisation of power to the SMC empowered the school and community to take over responsibility of the school education (MoES, 2003) and decentralisation was expected to mobilise local communities, generate resources and sustain education programmes. Therefore, the government planned to provide a block grant on a per child basis to the schools and give them full autonomy over the uses of the fund for school education activities.

The teachers talked about how the PCF budget was used to appoint local teachers to cover the shortage of staff in their schools and how most of the schools were unable to continuously receive that fund due to a drop in student numbers as the year progressed. In that situation, the SMC had to find alternative resources of funding to pay the teachers. Five out of sixteen participants were private teachers who received their salary through negotiation at the time of appointment. One of the private teachers, Elisha, expressed her dissatisfaction:

> The Government just pays Rs 3000 (US$27) for ECD (early childhood development) teachers and School adds Rs 4000 (US$37) on top that makes my salary Rs 7000 (US$64) per month. I don't feel I am different professionally, but my salary rate could create such feelings. I have a commitment to pass the exam one day and get a permanent job that will pay me an equal salary. I don't compare money with my profession.

Her statement highlights how perceived inequalities in salary affect teachers. Poudel (2014) examined how the recruitment of various types of teachers and provision of different scales of salary creates a sense of discrimination. Bikash from Buddha School argued that the head teacher might not be able to equally distribute work to teachers who have variation in their salary. He said:

> In my case he might feel hesitation to strictly put work over me. I'm paid Rs 9,000 (US$82) per month but other teachers get over Rs 23,000 (US$215) every month.

Similarly, Ekendra from Ekata School, who was a private teacher and did not want to mention his actual salary, expressed his fear of losing his job as soon as the

government appoints a permanent teacher in his place. He expressed his frustration:

> I get very low pay. This is all about bargaining like a supermarket. The SMC and administration just talk about work in the school but they never talk about a teacher's life. We have regular meetings about educational activities: 'Class is not going well, do this, do that, and so on.' When I raise the issue of salary, this never gets a space in the meeting. Sometimes there is frustration when the government teachers receive their salary. I wish the head teacher would give me mine separately and secretly. I can't compare my salary with others', but the work is not less. Instead, I might be working more than them. Why is that? It hurts me.

Ekendra's words reflect the frustration and humiliation that arises from salary differences as will be discussed in following chapters this kind of frustration impacts on teacher motivation and willingness to explore innovations.

Almost every teacher, including both permanent and temporary, echoed the opinion that different salary scales for teachers under the same roof affected overall practice in community schools. For instance, Anuj, who gets government a salary, said:

> This is also one of the leading causes of decreasing school education quality. Some teachers get a good salary under the same roof; some teachers get even less than 25% of the full salary. How can they teach happily and do well in the school? Why is the discrimination? If the government treats all of them equally, automatically education quality will improve. If the teachers don't get survival money, how do they feed their family, educate children and live a happy life? Even I am unable to buy a good smartphone *(laughs)…* I've an old cycle you've seen. Others ride expensive motorbikes. I'm here… *(laughs again).*

Although most of the participants in my study considered the profession enjoyable because they could share their knowledge, feelings and ideas with children, receive social respect and be accountable to their communities, they considered that unequal treatment of teachers impacted on the daily teaching and learning activities.

However, one permanent teacher, Bhupal from Buddha School argued that responsibility, honesty and duty play a more significant role in improving and learning than a teacher's salary. He stated that the government provided the teachers enough salary:

> Honestly speaking the salary was nothing but I liked teaching when I joined this profession. Though our salary was low, we could save almost all salary. Food, cloth, everything was so cheap. We didn't have place to spend money. It's not money. The government is giving enough salary. We used to get just 900 rupees monthly salary and now I receive Rs 23,000 (US$ 223) plus.

As a permanent teacher, Bhupal received the best salary conditions that are available. His claim that his love of teaching was more important than money was a genuine reaction but other teachers might say his opinion was safeguarded by the security of his employment and his salary. Poudel (2014) found that the different status levels of teachers in Nepal created a sense of resentment which affects educational quality. He further argued that some communities might not be able to fund their school's hiring of teachers.

The following statements by participants show the range of opinions about the importance of salary:

> Bikash: This is good profession. For the first two years I worked for free. Then I started to receive 500 rupees per month.
>
> Chandra: I used to get 350 rupees per month which was not even enough for a cup of tea every day. That was just to engage me.
>
> Dinesh: I had worked as a volunteer for five years. In the first three years I used to receive nothing but in the following two years the community paid me 500 rupees monthly. Gradually I now get 9000 rupees every month. This is my fifteenth year.
>
> Ekendra: I've heard government is going to recruit all permanent teachers. That's going to kick off thousands of temporary and private teachers. I don't have fear of that. I say I work every single minute while I am here.
>
> Elisha: I have a commitment to pass the exam one day and get permanent job that will pay me equal salary. I don't compare money with my profession.

Low, or even non-existent, salary and lack of job security were seen as problems, but there were also affirmations of commitment and resilience. It is within this complex employment situation that educational policy plans to transform traditional teaching and learning in primary schools through the integration of ICT.

Development of ICT Infrastructure in the Schools

An ICT infrastructure in the schools is a fundamental element in developing an e-learning environment and so would constitute a major part of designing a transformative educational policy, as planned in Nepal. However, the government has given little attention to the ICT infrastructure in schools. When *IT policy 2000* was introduced, it stated that one of the objectives was to use technology in distance learning (Nepal Telecommunication Authority, 2012 November 22). The *National Curriculum Framework for School Education, 2005* emphasised the policy of integrating ICT in school education but also identified the need to address the means of establishing ICT infrastructure in the schools (MoES, 2005). It stated:

> Curriculum Development Centre needs clarity on the ICT education in Nepali context, the minimum as well as desirable learning outcomes, the modality for introducing alternative measures, and the minimum infrastructure requirements (i.e. teachers, hardware, software, and internet access).

The framework also alluded to the slogan 'Computer Education for all by 2015' of the Government. The *Reformed National Curriculum Framework for School Education, 2007* endorsed the policy of ICT integration in school education (MoES, 2007) but again provided no strategy of managing ICT infrastructure in the community schools. However, the policy indicated that there was not restriction for other organisations to invest in this field of education. Although the *School Sector Reformed Plan, 2009-15* also emphasised the policy of ICT use in instructional activities in primary schools, it clearly stated that "currently funding is not available for this work" (MoE, 2009, p. 27).

Currently, ICT infrastructures have mainly been established in schools by two organisations: the Government of Nepal and NGOs, although there have been some unrecorded individual support given to the rural community schools.

Government Support for ICT

There are some high schools and lower secondary schools which received a block funding of Rs 140,000 (US$1284) for a computer lab from the government on condition of local contribution of Rs 60,000 (US$550). The scheme is currently not available for primary community schools (MoE, 2009). With the guidelines of the

School Sector Reform Plan, 2009-2015, the Department of Education under the Ministry of Education directed the Regional Education Directories and District Education Offices to prepare for the installation of ICT devices in community high schools, and out of 34,782 community schools, 8711 high schools in total were eligible to be funded for five computers, one printer and internet connection (EducateNepal, 2013 October 23 ; retrieved 2016 November 24). The government allocated Rs 1 billion (US$ 1 million) of funding. However, the latest *School Sector Development Plan, 2016–2023* stated that the Ministry of Education piloted the use of ICT in selected schools by providing computer labs and internet connectivity (MoE, 2016). The policy explicitly ignored ways to equip the community primary schools with ICT infrastructure. The teachers I interviewed argued that the primary schools did not receive any government fund for the ICT infrastructure in their schools, as the following comments illustrate:

> Chetan: Government is not going to provide.
>
> Deepa: We don't have that. Actually what I've heard from the head teacher is that higher secondary schools (*now secondary schools*) are eligible for the lab fund, then high schools and then it's turn of lower secondary schools (*intermediate schools but merged into primary*). Here, high schools received that fund and set up computer labs.
>
> Elisha: Everyone cannot afford it. If the government provides that technology for every school, that's different. But this is almost impossible at the moment.

However, two of the schools I investigated which run classes up to Grade VIII received some funding from the District Education Office (DEO). Those two schools received the grant of Rs 140,000 (US$1284) for their lower secondary level rather than their primary level. Anuj from Annapurna School said:

> We have done a good job buying three desktop computers and a printer plus photocopier with the joint fund of the school and DEO. The school raised sixty thousand rupees and DEO provided one hundred and forty thousand rupees for this. We are expecting more support from Open Learning Exchange Nepal.

Thus, government support is gradually moving down from high schools to lower level schooling. Nevertheless, there is an expectation that funding will be provided by other

organisations like Open Learning Exchange, Nepal, which has been supporting all of the schools in my study, and Technology Alleviating Poverty (TAP) (later renamed EduTech Nepal) one of the recent organisations supporting rural community schools.

Although the policy highlights the expectation of educational transformation through the use of ICT, the negligible level of support from the government for the development of ICT infrastructures in primary schools is unlikely to bring about such a transformation. Teachers' frustration with the uncertain future of digital devices in their schools was evident when I talked with them.

> Anuj: One day all these devices may not work. We have to save them.
>
> Ananda: If that situation comes one day that the NGO will leave us alone and not help out, are these devices going to be in a room like a museum?

Although the teachers I talked with appreciated the policy of integrating ICT in their teaching and learning activities, they repeatedly indicated that the policy seems to be very fragile. At the same time, they expressed the fear that without the synergic support of the government, the other existing sources of support may not last.

NGOs in School Education

The main supporters for ICT infrastructure in primary schools in rural Nepal are non-governmental organisations (NGOs). Open Learning Exchange (OLE) was the first social charity organisation to start the e-learning project *One Laptop Per Child* (OLPC) in primary schools in Nepal in 2008 with the collaboration of the government (OLE, 2017 March 15). The project provided XO laptops[11] to schools, initially working towards one laptop per child but later on the basis of the highest number of students in Grades 1 to 5. After signing a Memorandum of Understanding with the Department of Education in 2007, OLE started to develop digital content on the basis of curriculum and piloted it in two primary schools in the Lalitpur District in 2008 (OLE, 2017 March 15). The NGO is currently supporting 225 schools in 34 districts in different regions in Nepal. Although I had not intentionally planned it, all the schools in my study were in the project.

Another NGO, EduTech Nepal has already donated computer labs to 114 schools in

[11] Specific type of laptop designed on Linux programming for teaching and learning

various districts in Nepal and aim to meet the target of 1000 schools – primary and secondary (EduTechNepal, 2017). In order to access resources like OLE or EduTechNepal, a school has to have relations with the higher level authorities such as DEO, social organisations or other personal relations. However, these organisations approach schools in their ways too. My discussions with the participants in my study indicated some of the complications.

> Anuj: Even for these supports, the schools must have access to that level of resources. Our head teacher tries a lot. He shares his problem with everyone hoping to get support. He is good in communication. So, we got a computer lab from OLE, a library from Room-to-Read, and more books are coming from Indian Embassy.
>
> Asha: We have to find supporting organisations.

However, almost all schools in my study received their computer lab because of selection by the NGO following prior observation or official reports. The schools and their communities were required to add support to manage the technology. From what I was told in the interviews, it seemed that Annapurna School had to lobby more than the others. The other schools, Buddha, Chadani and Ekata were selected by the supporting organisation.

> Bijen: Actually this has connection with World Food Programme (WFP). They visited this school. Then we got this technology from OLE. They installed this lab.
>
> Bhupal: We did nothing for this. OLE staff were visiting different schools through DEO. They also visited this school.
>
> Bikash: WFP coordinated to provide this technology. We didn't know about this; OLE provided this laptop and supports the schools.
>
> Chandra: People from OLE came to the school to offer it.
>
> Chitra: Actually they came to observe the situation of our school before they offered this technology for our school. We didn't know they were watching us and the school activities. They observed our school classrooms, students, teachers' activities, location of the school, local environment and so on. Later, they visited our school a second time and offered this technology for our school.
>
> Chetan: Actually we didn't know about it. I think they were observing the

school and watching us unknown to us before they provided us. People used to visit the school frequently. We had not idea about OLE. When they formally came to us and explained about this, then we came to know.

Deepa: One desktop provided by local organisation, Shaikshik Namuna and then the school purchased five more. But we lost all in the April 2015 earthquake.

Ekendra: These were funded by a Danish project. These desktop computers were funded by an organisation but I forgot the name. Other laptops were provided by OLE.

Dhaulagiri School which lost its lab in the April 2015 earthquake, was initially supported by an unregistered local community organisation, *Shaikshik Namuna* (Educational Model) established by the joint effort of seven Village Development Committees in the district. Gradually the school purchased some other devices in the following years. The school also purchased a server for its offline e-library and digital contents prepared by the OLE. My interviews with the participants identified how invaluable the NGOs' support for the ICT infrastructure was for the rural community schools where the community itself could not manage the huge amount of funding needed.

There might be local organisations supporting local community primary schools which are unacknowledged because they are unregistered. While staying in Dhaulagiri School, one of the schools in a highly affected earthquake district, the teachers told me about a computer donation to their school, among others around the district, by an unregistered local organisation *Shaikshik Namuna*.

Curriculum and Textbooks

The Curriculum Development Center (CDC) develops the curriculum for high schools and primary schools under the Department of Education in the Ministry of Education. After realisation of the need for skill-based school education, it created the *National Curriculum Framework for School Education (Pre-primary – 12), 2005,* the first curriculum framework in Nepal. The National Curriculum Framework after evaluation of teachers' instructional activities in the classrooms criticised traditional approaches for delivery. It stated the approaches were not interactive, participatory and meaningful to learners (MoES, 2005). The National Curriculum Framework

further stated that even after several in-service training programmes, teachers were unable to transform their teacher-centred instructional activities to be child-centred. One key new content in the National Curriculum Framework was "ICT as a tool for pedagogic transformation" (p.10). This specified the strategy of integrating ICT in three ways:

i. as a tool for delivering information and/or services, including school administration;
ii. as a tool to teach other subjects; and
iii. as an academic curriculum subject to equip the students with skills required to succeed in the knowledge economy.

The National Curriculum Framework articulated a fear that "education will lose its relevance in the context of globalisation and generate disillusion among the young people – the product of the present education system" (p.24). Therefore, it demanded wider access to alternative learning resources like ICT facilities and self-learning materials.

Whereas the CDC publishes the curriculum, the Publishing Unit prepares the textbooks and Janak Education Material Centre produces and distributes textbooks to primary schools, which are free of cost for students. Prior to 2000, the prescribed hard-copy textbooks were the only resource materials for teaching. Before the education policy that organised all schools under national governance, schools had their own, often random, learning plans and content. The CDC was reorganised in 1997 with the aim of systematising curriculum and textbook publication in order to achieve national education goals (UNESCO, 2010). After 2000 the establishment of several private publishers was encouraged by the CDC to support children's learning in remote rural schools (MoE, 2009).

The *National Curriculum Framework for School Education, 2007* introduced a slightly different policy of prescribing multiple textbooks as learning resources, asking for scanned digital copies to be made available. However, the policy of involving private publications as competitors in the field was continued. The strategy increased the number of books in the hands of primary school children especially in private schools in the cities. Its gradual impact could be seen even in community

schools in the cities where additional textbooks in the English language published by private publications were prescribed. I found this to be the case in one of the schools in my study. One of the teachers, Chetan from Chadani School explained why they prescribed three additional textbooks on top of the five existing government prescribed textbooks from Grade 1 to 3 and three additional textbooks on top of eight government prescribed textbooks in Grades 4 and 5.

> There are three – *Nepali Byakrana* (Nepali Grammar), extra maths and English Grammar. Of course it is an extra load for us. We have to teach double. There are similar contents. Maths is in English. These extra books are for all from grade one to five. All the schools have followed that. Even if this is an extra burden for teachers, we have to add them.

The textbooks are prescribed and individual subject tests monitor whether or not the teachers are strictly following those books. It is evident from the data analysed that the textbooks are considered to be the major resource for teaching. The *School Sector Development Plan, 2016-23* (SSDP) criticised teachers for not understanding the curriculum:

> Many teachers and the general public consider textbooks to be the end-all and be-all of the curriculum and all teaching is therefore tied to these books, with only the memorisation of the text often being the result. The examination system often reinforces this approach (p.22).

The SSDP plans a systematic revision of textbooks on the basis of the reformed curriculum and aims to provide online modules and digital teaching and learning materials like e-libraries and audio-visual contents in many more schools. However, my study revealed that some of the teachers in my project had been relying on both prescribed textbooks and digital contents to teach, as Chetan explained:

> There is the curriculum of textbooks. We prepare plans combining both textbook and digital contents, and teach all the contents.

This dependency went against the direction of *School Sector Development Plan, 2016-23* which intended that integrating ICT in pedagogics would improve and transform classroom delivery so that teachers would use the curriculum rather than depending on a textbook. In contrast, several of the teachers I interviewed indicated

that they did consider the curriculum rather than relying solely on textbooks, as Deepa explained:

> I didn't know at the beginning how to teach but later I realised I worked out of curriculum. I do prepare lessons on the basis of curriculum. No problem at all because everything we teach is based on curriculum. Without the curriculum the textbook is not made. So, textbooks can be used to only give homework. All activities can be done with the curriculum guidelines. The students can do textbook activities in groups or individually themselves.

However, the teachers I talked with criticised the contents in the curriculum, pointing out problems with contents that were irrelevant to the locality and that contradicted the ways local families teach.

Selection of Contents, Local Context and Learning Difficulties

In Nepal, the current practice of education has a standard curriculum for all schools whether in the city or the rural village, although in certain subjects like Social Studies, Environment Science, there is space for local teachers to create their own content that accounts for 20 to 25% credit. The reason for giving local teachers choice is to enable learners to learn about their local environment. The teachers I interviewed affirmed that the contents and structures in the curriculum made a difference. For instance, Anuj, who is a Mathematics teacher, appreciated the variety of practical contents in the Geometry and Arithmetic curriculum.

> In case of geometry, they learn to measure local things in front of them. In arithmetic, they learn to calculate daily transactions like interest of a loan, what is loan, etc.

Similarly, Elisha indicated that the digital contents were systematically selected and designed on the basis of curriculum. She liked the way that the videos, games and music on the digital devices allowed children to have fun and learn on their own.

> There are videos and games too. When the children feel bored, they can enjoy them. Otherwise all the contents are systematically designed on the basis of curriculum. There are musical instruments and music, various subject materials, memory games.

Ananda affirmed that the audio-visual materials on the digital devices were relevant to the prescribed textbook and curriculum and endorsed the need to prioritise the local

environment while selecting contents for teaching, although he noted that everything does not suit environment:

> Contents definitely match. The materials in this device are designed looking at curriculum and the textbook. Some more materials are added. They are not exactly the same. Almost all are related to each other. In the textbook, we find just limited examples but there are many practice-oriented materials on these devices. Everything does not suit the environment. It's not going to happen because there are different communities, languages, cultures and natural environment. Like these textbooks suit for some communities but not with all. We have different languages in different communities. Even Nepali has varieties. May be 80% of the community find it suitable but 20% may not. We are trying to collate things.

He acknowledged that it may be impossible to make a curriculum that suits all communities. His experience suggested that there were various socio-cultural and environmental aspects to be considered in selecting the contents to suit the local community.

In contrast, some of the teachers for example, Bhupal, Bikash and Deepa, criticised the curriculum for having unauthentic contents in terms of the local environment:

> Bhupal: It's common sense that children learn the alphabets from their parents and other members in the family. Many come to the school after learning 'क /k/, ख /k^{h}/, ग /g/, ….'. Then they start writing stuff after ten or eleven days. It's abnormal for children to start from 'ग /g/, म /m/, भ /v/, ज /z/ … in Nepali. At least the education experts should realise that this is not America. This is not America, is this? No. The contents of America cannot work here. The curriculum should be suitable for the local community or ground. We've got exams controlled by a cluster of schools. They design questions on the basis of that curriculum. Now I must follow the curriculum.
>
> Bikash: There was a system of teaching basic alphabets first and then giving them a book later. Now we cannot do that because these basic alphabets are randomly placed in the textbook. Now the children learn all the alphabets at the end of the book. This is the same case in Maths. When they completely go to the end, they learn a total counting system. This is not so suitable here or in this context. I know this is prepared by experts.
>
> Deepa: Education must match the needs of the learners but I don't find that.

> A five-year-old child learns a lot of things before she goes to school. In fact, my niece and nephew have already learned a lot in the family. They only need to develop skills in school but the education system doesn't focus on that.

The experience of Bhupal indicated that there were three major problems: selection of authentic contents, systematic arrangement of those contents and the examination system. He suggested that the subject experts need to consider these major issues while designing the curriculum. Bikash and Deepa were also concerned about the way the curriculum was structured and felt it would not support children's learning. Deepa criticised education for ignoring the skill development in learners.

The *National Curriculum Framework for School Education, 2005* had already documented that this issue was reported by UNICEF in 2000 and defined a range of 'competences for life' that the students need to develop through school education (MoES, 2005). Later, the *ICT in Education Master Plan, 2013* focused on training teachers and hiring ICT experts to develop suitable interactive digital contents (MoE, 2013). It planned a shift from printed materials to interactive CD-ROM based digital contents and web-based activities. The *School Sector Development Plan, 2016-23* focused on skill buildings and learner-centred pedagogy (MoE, 2016). Success of the plan will depend on how the teachers use the curriculum in their teaching practice. As the *School Sector Development Plan, 2016-23* criticised teachers for considering the textbook as 'the end-all and be-all of the curriculum' (MoE, 2016), the use of curriculum for planning daily teaching becomes a key strategy for teachers' professional development.

Use of Curriculum in Preparing Teaching Plans

The curriculum specifies the core content areas that allow the teachers to adapt local contents to suit the local context without violating national education goals. Therefore, the *National Curriculum Framework for School Education, 2007* emphasised that curriculum as a basic instructional material should be made easier, simpler, convenient and empirical (MoES, 2007). The *National Curriculum Framework* prioritised the implementation and effective use of the curriculum. In an American context, Tyler (2013) stated that the teachers must be sure of educational objectives to study an educational programme systematically and intelligently. The objectives thus become the guidelines for teachers to select educational materials,

instructional strategies and testing systems. My interviews with the participants of my study delved into whether or not they used the curriculum to plan their teaching and learning activities. I received a variety of responses. For example, Ananda said:

> I think every teacher must have it. We have one in our school. We go through it. There are specific objectives, time allocations, period numbers, full marks, and distribution of marks for different exams in an academic year. I don't think it is followed every day. It's not well practised.

Among the four participant teachers in Annapurna School, three acknowledged that they were unaware of what the curriculum meant, although Ananda, who had been teaching in the school for eighteen years, explained the various sections. He agreed that there was not a culture of following the national curriculum once they had a prescribed textbook in their hands. Similarly, Binod from Buddha School gave contradictory explanations about the use of curriculum in his teaching plans when he described his use of digital devices:

> There is exactly the same textbook too but there are other audio-visual materials. In *e-paath*[12], there are contents related to curriculum. When we ask them to open a particular content, the children find that and go there. There may be a curriculum but I have to ask the head teacher.

However, Bhupal and Bikash confidently explained how and why they have to follow the curriculum guidelines in their teaching plans. They emphasised that they have cluster examinations that necessitate every school teacher in the cluster to follow the curriculum in their regular teaching plans:

> Bhupal: Curriculum says something, and I do different? That's not regular as I have to do what the curriculum says. We've got exams from the cluster. They design questions on the basis of that curriculum. Now I must follow the curriculum.
>
> Bikash: There is a curriculum that we must follow. We have to complete the targeted course too. This school cannot go on its own. We have a resource centre that we have to follow. If we try things in our own ways, we will be behind in our course.

However, the teachers in Chadani School were very vague about the curriculum:

[12] An application on XO laptop that contains digital contents of various subjects

Chandra: Maybe in school.

Chitra: Objectives are mentioned but I haven't gone through the curriculum. Every subject curriculum is there in a book.

Chetan: There is no curriculum. There is curriculum of textbooks but not of e-library books. We prepare plans combining both textbook and digital contents, and teach all the contents. I've got a curriculum but not seen that kind of information in it about ICT. I heard that is given on websites but I don't know. I will search ICT in the curriculum.

The response of the teachers from Dhaulagiri School and Ekata School reflected that they consciously used the curriculum in their teaching plans, although Ekendra who came from another background than teacher education did not show such awareness. Their comments included:

Deepa: I learned planning according to the curriculum I bought myself. Yes. All teachers have. I didn't know at the beginning how to teach but later I realised I worked out of the curriculum. I do prepare lessons on the basis of curriculum.

Dinesh: Yes, normally I look into it.

Ekendra: There is an objective that talks about the use of ICT in teaching and learning. I'm not sure how much it is going to be successful.

As I collated my participants' responses I reflected that while the majority of them considered they were following curriculum guidelines, their understanding of the prescribed textbook as itself curriculum confirmed the conclusion of the *School Sector Development Plan, 2016-23* (MoE, 2016), that teachers lacked the knowledge of how to use curriculum in their instructional plans. Various responses from individual teachers in the same school also seemed to indicate that there was lack of a collaborative culture among them. However, the responses particularly of Bhupal, Bikash, Deepa and Elisha suggested that many primary school teachers were aware of the educational guidelines they needed to follow to meet the objectives. The range of responses from my participants also suggested a need for regular monitoring, supervision and evaluation from the DEO, in accordance with the responsibility stated in *Education Rules,* 2002 section 36 (1). The policy introduced Decentralisation of the School Management System to empower the SMCs and to provide an opportunity for the local schools to develop their local curriculum (MoES, 2003). The system

increased the power and responsibility of the SMC in the educational management of the local community schools in Nepal. Consequently, the roles of head teacher, School Inspector (SI) and Resource Person (RP) became vital in the decentralised school management system.

Decentralisation of the School Management System

The Government of Nepal brought in the policy of devolving authority to manage local community schools in 2002 (MoES, 2003). Although the policy did not decentralise the whole system of managing teachers (permanent teachers, for instance, remained centralised) this allowed the SMC to appoint temporary, PCF, *rahat* quota (relief quota) and local teachers (Khanal, 2011). The system called for the Village Education Committee (VEC) to prepare a comprehensive education plan (MoES, 2003) and expected the involvement of stakeholders such as parents, community, students, Resource Persons, School Inspectors, School Management Committee, District Education Office in school education activities and in assuring the quality delivery of education through local schools. The policy also allowed partnership relations with government, non-government and international non-governmental organisations. Local community schools started to exercise the management of finance, teachers, resources and instructional materials (CERID, 2009).

Role of SMC and Community in Adapting ICT in School Education

In the decentralised school management system, the School Management Committee of community schools took over responsibility for managing the teachers, mobilising the local resources and participating in educational activities. The *Education Rules, 2002* generated a system of grouping local schools in a cluster around a resource centre (RC) school with the purpose of providing services and facilities to the member schools, monitoring the schools' practice and governing terminal and annual examinations.

However, Poudel (2014) argued that the decentralised school management system could only be effective in an environment where the community people are educated enough to take power and carry out their responsibility. In my interviews with the participants in this study I found that many teachers criticised the SMC for being

more interested in the financial aspects of the school rather than educational ones. For instance, Ekendra said:

> There is an SMC but just for formality. The community cares only about negative things but never thinks what they can do for school education. They are much more aware of school budget, expenditure and other logistics. This is not going to improve education and society. If the parents were highly educated they would question the head teacher and teachers. We cannot just blame them although they are responsible.

He expressed appreciation of the willingness of parents to support for ICT integration in teaching and learning activities, saying:

> They say in the meetings, 'If our children are learning computer, we pay fees. We raise fund for repairing the computers'.

Responses from other teachers in this study varied a little according to the school but tended to contain a mixture of criticism for the SMC, uncertainty about its activities and affirmation of the hard work of community people. Example of their comments are offered:

> Binod: What they have done is they have given the whole fund the villages receive from the VDC every year for the school, instead of giving from their own pocket.
>
> Bhupal: If I say they are not active, they're very active to do some physical works for the school like rebuild the house, ground, furniture and other activities.
>
> Chandra: Good support. The people here carried bricks, gravel, sand and other materials to build the school buildings. That's what they can do.
>
> Chetan: If the community wishes, all the schools will be magically improved.
>
> Deepa: To be Chairman, they move their children. They talk but never do anything. They talk about raising education levels after observing other schools, but they don't appoint a computer teacher. They don't even give support to repair computers. I called my relatives several times. We don't know everything about the SMC. The head teacher might know but he doesn't share with us.

Despite criticisms all these comments acknowledged that there was an active involvement of the SMCs and the community people in the schools to manage the

financial and physical infrastructures of the school. The teachers, especially of Dhaulagiri and Ekata schools, criticised the orientation of the SMC towards maintaining the yearly budget. Deepa from Dhaulagiri School criticised leaders in the community for transferring their children from one school to another to get the positions in the SMC. The teachers in Chadani School seemed to feel they had a strong community who cared for the school.

The teachers in Annapurna School tended to acknowledge that they have an SMC that is very active and a supportive community. They appreciated the SMC's communication with the NGO to help procure and fund digital devices through the District Education Office. For example, Anuj stated:

> No matter who the chairman of our SMC was, he has played a good role to develop the school. The school today is as it is because of their positive role. The chairman involves all political party representatives somewhere in different functional bodies. This is positive. The SMC manages infrastructures, funds and other necessary things. The NGO people collected all information about our school beforehand and observed the school. They wanted us to provide a spacious room, electricity and furniture as a requirement for computer lab support. We could manage that. Next thing the SMC and administration acted to achieve that.

Ananda considered that the head teacher has the more influential role in determining educational activities in the school despite the apparent power of the SMC:

> If we really want to shift the education and develop, head teacher is the most responsible body, then teachers, next parents and SMC. SMC seems to be on the top, but in educational activities others are more responsible.

Khanal (2011) observed that the system of SMC formation is ambiguous about whether community members or the representatives of different political parties are to be involved. Some SMCs in the community schools are likely to be politically dominated and may be ineffective in achieving the educational objectives. I observed the influence of political figures in one of the schools in my study. However, my observations and reports from my participants indicated that the voluntary service SMCs give to build the infrastructure like buildings and furniture to communicate with higher levels of authority, such as DEO, for the acquisition of computer labs and the provision of funds for private teachers were remarkable.

School Inspectors and Resource Persons

Every Resource Center (RC) has a School Inspector (SI) and a Resource Person (RP) to support cluster schools in their educational activities, monitor their activities and communicate their information to the DEO (MoES, 2003). The School Inspector, as a senior, works with the Resource Person to manage teacher training, inspect teaching and learning activities in the schools, provides feedback to the teachers, supports the head teachers and communicates any problems to the DEO. The *ICT in Education Master Plan, 2013* allocated implementation of ICT in teaching and learning to Resource Centres (RCs). The strategy was to initially equip Resource Centres with a computer lab and internet and then make the centres responsible to coordinate the member schools to provide them with technical support (MoE, 2013). However, when I talked with the teachers in my study about the role of the Resource Person and School Inspector in schools, there were more complaints than positive comments against. For instance, Bhupal expressed his frustration as he talked about the loss of quality in school education:

> When I started this job, there used to be just one High School Inspector and two Primary School Inspectors. We were always careful in our job. Oh, when is he coming to our school? This was always in our mind. They used to visit the schools, once a week, or if late, in about ten or eleven days. They used to observe our classes, give feedback immediately. That used to encourage every teacher to do their job and do it really well. I had feelings of doing a job, and the will to prepare everything for the job. It seemed that enthusiasm, power, feelings, and everything went down slowly. Facilities were increased; several schools were established in every village but why is quality decreasing? It should be growing when the facilities increase. That's not happening actually. There's no inspection to check how we've been using these laptops in our teaching and if the students are learning. So what's the point of RPs and Inspectors?

I heard a similar complaint from Ekendra from Ekata School.

> There's no systematic work. Government officials don't know what their role is. They are never clear about the rules and regulation, responsibility and duties. I've been here for five years but none has observed my class yet. RP and School Inspector, where are they?

Many of the teachers were not willing to talk about the Resource Persons and School Inspectors and I wondered if their reluctance indicated that they were afraid to speak

against the government officials. UNESCO (2007, p. 17) reported that the teachers in Nepali community schools perceived "supervisors as a threat as they could transfer the teachers without good reason". However, Bhupal openly expressed anger as he criticised the officials:

> The government officials have not done their job honestly. Now every resource centre has one RP and one School Inspector. They are permanent staff to support the teachers. You know Silgadi; RP lives there but look! he hasn't signed our school register even once. Why? He's not made any school visits. There is no point of an RP. He's appointed to support school teachers, take reports to district education office and help the school. They are useless. Government is wasting money on them.

The criticisms from my participants aligned with previous research. For instance, Khaniya (1997) found that there was almost no school supervision because of insufficient travel allowances. Bhatta (2005) found that the RPs and SIs were confined to district headquarters as DEO-hands. Santwona Memorial Academy (2011), a research organisation, reported that only 25 percent of the Resource Persons occasionally visited some of their cluster schools because they were unable to cover all of the 56 cluster schools that were the average allocation.

Many of the teachers I talked with considered that they could access support for the technology resources through NGOs or other funding organisations if the head teacher was strong enough to work for the school.

Head Teacher's Role in Accessing Resources

It is general practice in Nepal that the head teacher of every community school leads the administration. In rural primary schools, there are unlikely to be additional administration staff because of the extra cost burden. Almost all the head teachers teach regular subjects like other teachers in primary schools with administration on top of their teaching job. In four of the five schools in my study, I found the head teachers teaching regular subjects. Two of the five school head teachers had an equal number of teaching periods to other general teachers in the schools. The extra load of administration seemed to be overload on the head teacher.

The *Education Rules, 2002* specify responsibilities of the head teacher including preparation and execution of academic plans, communication with the District

Education Officer through the Resource Centre involving the Resource Person and School Inspector, management of staff salaries, reporting of academic activities to the DEO, evaluation of the staff performance (and consequent action if needed), and accessing of resources for school development. Community schools are encouraged to develop relationship with NGOs seeking their support for resources and the head teacher plays a significant role to creating such relationships (Dhakal, 2007).

All the teachers I interviewed commented on the vital role played by the head teacher in finding sources of funding for the technological infrastructure in the school. For example, Anuj described the work of the head teacher in establishing links with the higher level of the education sector and with NGOs to get various kinds of support such as library books, ICT infrastructure, and funding for buildings:

> Even computer lab support, schools must have access to NGOs. Our head teacher tries a lot. He shares his problem with everyone hoping to gain support. He is good in communication. So, we got computer lab from OLE, a library from Room-to-Read, more books are coming from the Indian Embassy. There are many schools in Banke which don't even have good benches for students.

Anuj explained that in his school the teachers have a culture of sitting around the table together with the head teacher, discussing the issues and planning school activities. He expressed appreciation of how his head teacher carried out his role:

> Our head teacher collects suggestions from every teacher and other concerned people. This is good I think. When he moved in to this school fifteen years ago, the school was in poor condition. He explored resources and built school buildings, and brought a computer lab.

However, as Khaniya (1997) found, in the context of Nepal it is not easy to develop needed links with organisations and maintain frequent communication; head teachers often have to walk for more than one day to reach district headquarters.

The teachers I interviewed tended to judge their head teachers according to their ability to gather resources. Ananda from Annapurna School explained his understanding of the head teacher's role:

> If we really want to shift education and develop, the head teacher has the most responsibility. Then, parents and the SMC. The SMC seems to be on

> the top, but in educational activities to impart quality education, the head teacher has the vital role. The head teacher makes a plan without which nothing goes ahead. In our case, the head teacher is not weak.

Ananda continued by enumerating the exemplary works his head teacher had carried out for the development of the school, such as a new school building, toilets, walls around the premises, a library and a computer lab. On the other hand, teachers in Buddha School expressed their dissatisfaction with the weak role taken by their head teacher. For example, Bhupal said:

> The head teacher's just limited to the school. He doesn't have good communication with the higher level.

Bikash expressed his perception of the head teacher's role in his school and considered that he had difficulty to strictly enforce the school rules and regulations as the teachers were local:

> The head teacher is the one to run this school, but it is difficult for him to be strict to the local teachers.

The teachers from Dhaulagiri School, which lost its ICT infrastructure in the April 2015 earthquake, were also dissatisfied with the work of their head teacher. Deepa cautiously criticised the inefficient and limited role of the head teacher in the school for not having good communication with higher levels, such as the DEO or NGOs:

> Actually those schools that are very close to the organisations and government bodies get every kind of support. Like schools located around Dhulikhel and Banepa have more access to such organisations. They get all these facilities but we don't. They don't even have qualified teachers but they have plenty of computers. That's what we tell to our head teacher. We know a teacher does not have to carry a heavy load if we have enough computers. I even said I would contribute one month's salary. I have contributed as much as the head teacher has. I lose nothing with this contribution, but it makes a difference in the community. But he says, 'Why is it just us who support every time and not others?' I told the head teacher hundreds of times to call the community together and talk about technology awareness. Over seven years I think I have been saying the same thing. Our job is to educate people, but not just inside classroom. He only replies it is a good idea but he never does it.

Dinesh raised a different issue that he considered hindered the leadership capability of

the head teacher. Although he seemed to shy away from exposing the head teacher's weakness, he said:

> There is politics everywhere, in SMC formation, in fund management, in the construction of building. He is a good man but he has pressure on him.

The teachers of Ekata School seemed reluctant to speak against the efficiency of the head teacher, but their comments seemed to be indirect criticisms. Ekendra talked about his need to frequently repeat the same request for bringing in new technology: "I always ask the head teacher to bring new technologies in the school."

Elisha seemed to start with criticism of the head teacher but quickly diverted the issue to the teachers' ignorance about how to use the school's computer:

> This year the school has brought the plan of promoting ICT. The head teacher is responsible. At least he can ask all the teachers to go to the lab in their leisure time and work on the computer. They could type and save files. I think if they start to use it, they will come to love it day by day. The more we use it more we learn and become interested in it.

Elisha further explained:

> We don't have sufficient computers. We only have eight desktop computers and just four are working. We need at least twenty to provide space for every child in the lab. I talked to the assistant head teacher about repairing them. We've kept these laptops on charge but the battery drains automatically.

I observed during my field visit work that, although the school owned at least 30 laptops and eight desktop computers, the teachers had stopped using them for the past two years.

The teachers in the various schools in my study had differing opinions about their head teachers' ability to secure ICT resources. In three schools, teachers praised their head teacher for skill in communicating with the funding organisations for digital labs and for organising teacher training and a refresher course in ICT. Teachers in the two other schools seemed to suggest their head teacher showed inefficient leadership in accessing external resources for developing ICT infrastructures and lacked knowledge of how modern technology could be used in teaching and learning. Salahuddin (2011), in his study of head teachers in Bangladesh, similarly reported that many lacked

understanding of the role of technology in education. In all five schools, my own observation and teachers' comments indicated that head teachers were overloaded with the combination of teaching and administrative activities. When listening to the teachers' comments about the role of head teachers, I recalled Robinson (2011) reporting research in a New Zealand context which emphasised the importance of head teachers being able to focus on leadership.

Drivers of ICT Integration in Education

As detailed earlier in this chapter, since 2000 the Government of Nepal has identified a range of purposes of ICT in education. The first *IT Policy, 2000* focused on the expansion of distance education and social unification (National Planning Commission, 2003). Later, the *National Curriculum Framework for School Education, 2005* emphasised the use of ICT (a) as a tool to teach other subjects; (b) as an academic curriculum subject to equip the students with skills required to succeed in the knowledge economy (MoES, 2005). The framework focused on adapting ICT in education according to what it named as twenty-first-century "human civilisation" (p.10) and on transformation of teaching and learning, in terms of establishing collaborative learning, and child-centred learning by using ICT.

The *National Curriculum Framework for School Education, 2007* continuing the *National Curriculum Framework for School Education, 2005* strategies focused on "globalisation" (MoES, 2007). Despite lack of allocation of budget for the plan (MoE, 2009), the *IT Policy, 2010* emphasised the provision of internet for community schools (MoST, 2000). *ICT in Education Master Plan, 2013*, the first standard official policy document on ICT in education, specified the use of ICT in two ways: ICT in education and ICT education. The first purpose referred to the use of ICT as a tool to support the delivery of specified curricular contents through the use of ICT, and the second referred to the teaching of ICT as a separate subject (MoE, 2013). The plan stated: "More specifically, ICT has been considered as an effective tool for educational transformation through improved teaching-learning process making learning horizon wider" (*ibid,* p.23). The latest official document, *School Sector Development Plan, 2016-23*, also emphasised a transformation of pedagogy to improve learning outcomes (MoE, 2016).

Although the various documents have used different terminologies, such as civilisation, globalisation or transformation, the definition of those terms in the document indicate that the Government of Nepal aims at decreasing the digital divide between itself and developed countries by adopting ICT in education. My interviews with teachers in the community primary schools explored their perceptions about the use of ICT in teaching and learning activities, focusing especially on globalisation, learning opportunities, improvement of education quality and transformation.

Globalisation through ICT in Education

The revised *National Curriculum Framework for School Education, 2007* emphasised the integration of Nepal into the global community through educational transformation with the integration of ICT in school and higher level education (MoES, 2007). It precisely and persistently focused on ICT as a "need" of the growing generation in order to be a part of a global community and to "reform access, equality, relevancy and quality in order to promote lifelong education" (p.6). Anuj explained how his school had accepted ICT as a strategic component in his school's teaching and learning:

> Actually DEO selected our school to provide *e-paati* (Nepali name for laptop) and SMC accepted this. The SMC and administration stepped forward to get this technology. I think they understood the need of such technology to increase the quality of education.

DiMaggio et al. (2001) argued that ICT is a need of the fast changing world. Many of the participants in my study seemed unsure about why the school had planned and brought educational technology into classroom teaching and learning, but they agreed that ICT was demanded by society. Anita reflected that ICT could not be avoided as there were other schools already using it:

> Even if it is not in our school, in other schools they are teaching it. I think it is a kind of experiment. The world is becoming one of computers. Everything is done with computers. Even children can learn with technology. I think it is considered as a need of the current situation.

It seemed that the influence of other communities, the social environment and the global spread of ICT use in teaching and learning created an obligation for the

community schools to adopt educational technology in their classroom teaching and learning. The *ICT in Education Master Plan, 2013* in recognition of the global development of ICT in education, stated an expectation of connecting national institutes to global educational institutions in order to provide feasible access to digital resources (MoE, 2013). The *School Sector Development Plan, 2016-23* pursued the policy of adopting ICT in school education.

Learning Opportunity for Teachers and Students

The rapid development of computer technology and its rapidly increasing use pervades many parts of modern life. Although information technology was initially more focused around the business world, it has gradually emerged into learning recourses. There has been spreading use of cellular mobiles, television, computers, and Wi-Fi in Nepal. The successive education policies, frameworks and plans set out to create a distance learning environment through the use of information technology. The aim was to provide unlimited opportunity for the teachers and students to access unlimited information.

Most of the teachers in my study expressed the opinion that the policy of bringing ICT in their instructional activities has had a positive impact on their daily teaching and learning activities. Anuj, Ananda, Asha and Elisha talked about ways that ICT has offered teachers and learners opportunities for learning beyond school, for example, at home or in town. Anuj talked about how ICT skills have become a fundamental requirement of life:

> Now this has become a basic need. Education policy focuses on ICT in education. Even these laptops have come through that programme. It seems like if someone doesn't have skills of computer, they won't get any job opportunity. So, this is compulsory in life today. It's like a pen that we need daily.

Similarly, Asha talked about how school children learn from television:

> Studious students can get better knowledge from TV programmes. Like Bed Prasad in Grade VIII watches the news on TV a lot. When we have quiz, he is always on the top because we ask lots of questions about current affairs.

Asha's example supports Cleanor and Trinder (2010) who found that some learners

choose and use digital technologies primarily for personal purposes whereas others choose such technologies for learning, and communication.

Elisha described how she made use of the internet to search online information for teaching lessons in the classroom.

> I teach General Knowledge. I search information on Google by using mobile data. When I don't know or I'm confused somewhere, I use the internet. Even in the classroom, I open data to search for information. Not that much but sometimes.

Ananda talked about teachers' keenness to learn how to use such technologies in their teaching and daily life.

> We had seen computers in the towns. So, we were very much interested to bring them into the school. We thought we would learn ourselves and teach the children. We were so happy. And now we have to learn new technology.

However, Ananda's comments seem to reflect the way educational technologies were brought into the classroom teaching and learning without full planning and preparation by the school and seem to reinforce Anita's comment, quoted earlier, that the policy of integrating ICT in school education is highly experimental.

Nevertheless, the decision of adopting ICT in teaching and learning activities has provided the teachers and learners with opportunities to learn new skills. Deepa stated:

> Actually the teachers were not confident themselves about using computers. They used to hang on the computer more than students. I think that made them slow in learning.

Deepa later expressed frustration about losing the school's entire system of technology in the April 2015 massive earthquake that destroyed the whole school infrastructure including the computer lab. She recalled how the teachers were attached to the use of technology:

> We talked about it seriously. It's not possible to carry on our teaching without technology because we have been used to do it that way, and the children as well. It is inevitable for this generation. Even vocational subjects have chapters about ICT or IT. There is now a problem for us to teach our

> curriculum, but we have to do it.

Deepa's concerns seemed to reflect the finding of Wall et al. (2005): that teachers become habituated to teach their lessons with the available technologies and Lee's (2002) finding that students become attracted to learning in the computer lab. Dinesh also commented on the way students had incrementally become independent in using ICT:

> If a child has that opportunity to play with computer in Grade Two, of course that child learns a lot. They can work on their own.

Dinesh's comment aligns with Majumdar's (2015) observation in a similar context in India that the opportunity for the children to take turns using digital technologies in their lessons gradually leads them to become more productive. Dinesh added a further reason to adopt ICT in local schools:

> There is another reason to adopt this approach. Most of the community people prefer private boarding schools. They leave the community schools. So, why do we not teach using computers? Children like to go to private schools because they get the opportunity of learning with computers. So, if we have computers, can we not keep them here? This is one of the main reasons of bringing computers into our school.

I learned that it is publicly acknowledged that private schools have far better management of ICT resources for teaching and learning. Dinesh's comments highlighted a possible strategy of attracting the local students to the community school through transforming classroom approaches to teaching and learning.

Overall I found that the teachers I interviewed accepted the strategy outlined in the *Education Master Plan, 2013* to adopt use of ICT in community primary schools as a means of providing learning opportunities with the new technology, and as a potential means for teachers and children even in rural villages to compete with private schools in towns or cities.

Pedagogic Transformation for Improvement of Education

The *National Curriculum Framework for School Education, 2005* and *2007* stated that the intention of integrating ICT in teaching and learning was to transform traditional teaching and learning strategies to a child-centred learning approach

(MoES, 2005, 2007). Consistent with this aim, the *ICT in Education Master Plan, 2013* emphasised the goal of transforming school education throughout the country (MoE, 2013). More specifically, the *School Sector Development Plan, 2016-23* aimed to transform pedagogy by integrating ICT in teaching and learning activities (MoE, 2016).

It is perhaps too early to evaluate whether the integration of ICT will bring a transformative change in pedagogy. However, the enthusiasm for using ICT in their classroom activities expressed by many of the teachers in interviews suggests that they see such a transformation as desirable. Anuj explained that the use of ICT has made teachers' jobs easier rather than changing the way of teaching and learning:

> If it promotes schooling, why should we not take the opportunity? We knew it was an extra burden because the teachers needed to make an integrated plan for teaching lessons. We were ready to do that to improve school education and focus on the quality of education. Rather than creating change, this has made teaching and learning easier. Normally we teach a lesson in normal class and then take our students into the lab for the practice of the lesson.

Implementation of the policy called for availability of ICT beyond school. Ananda commented that for children to learn themselves they needed to have access.

> It's not only for us. It's for community children to familiarise themselves with the technology and learn with it. We chose this approach to suit education for the new generation to accommodate into modern world. We had a concept of producing the kind of manpower that could work in this modern world.

However, Bikash expressed a caution that only making such technologies available for the teachers and learners may not be enough to improve learning:

> The policy is good. We have got this technology in our teaching and learning activities. There are modern technologies and better access to information but the education system in earlier days was better. The learning system was strict. When the teachers used to say 'memorise', we did that. In Grade Three we used to learn to write letters to our mother and father, and we could do it. Now there are more sources of information but children's writing practice and skills are weaker.

The cautions and reservations voiced by these teachers led me to reflect that

sometimes, the simple provision of technology to a classroom can improve the school. However, it depends on the context, as Toyama (2011) argued that technology could help good schools become better but it could also make a bad school even worse. In this context, Bontempo (2009 October; retrieved 2017 March) argued for the need for teachers to first learn how to use digital technology and then to learn how to employ the technologies in their daily teaching and learning. These writers' observations imply that it takes more than the provision of computers to implement the policy of pedagogical transformation with the integration of ICT in community primary schools. As Toyoma said, what technology we are using is not as important as how we are using the technologies.

Summary

This chapter has provided an account of the development of educational policies from 1954 to the current period by which the Government of Nepal has sought to transform pedagogy and community primary school education. It has also identified and briefly examined a number of key issues that have emerged as a result of these policies that will be further examined in the following chapters.

The major reforms, *Educational Rules* 2002, *National Curriculum Framework* 2005 and 2007, *School Sector Reform Plan* 2009-15, *ICT in Education Master Plan* 2013 and *School Sector Reform Plan* 2016-23 have informed the planned strategies of integrating ICT in instructional activities in community primary schools in rural Nepal with the aspiration of transforming education. The decentralisation of school management system has empowered individual School Management Committees and the Government of Nepal has been gradually transferring the management of community schools to the community. The policies allowed community schools to establish relationships with NGOs and these have provided various forms of funding for the schools. As a result of the *National Curriculum Framework for School Education,* 2005 and the reformed *National Curriculum Framework for School Education,* 2007, the schools have begun to adopt ICT in their school teaching and learning activities.

Although the government developed a policy of integrating ICT in instructional activities in community schools, there has been no funding for the schools to develop ICT infrastructure. There are some high schools who have received Rs 140,000 on

condition of contributing local fund of Rs 60,000 to purchase computers, printers and photocopiers. Primary schools, however, are still excluded from government funding for ICT infrastructures. The open education policy has provided opportunity for the community primary schools to seek external funding sources for the development of ICT infrastructures. Open Learning Exchange, one of the NGOs has been working with the collaboration of Ministry of Education Nepal to provide ICT infrastructure, teacher training and technical support since 2007. Other NGOs and unregistered local organisations also provide some support for rural community primary schools but these are not officially recorded.

In addition to providing a historical account, I have included comments from the participants in my study to indicate what the community schools have been doing to adapt educational technologies in their instructional activities and how the teachers have been using the available ICT and resources. The teachers' comments show that they have prepared integrated plans for using ICT and prescribed textbooks to deliver their classroom lessons. From our discussions, it seemed that all of the sixteen participants in my study appreciated the value of integrating ICT into their teaching and learning activities, but they criticised inefficient teacher development strategies and uncertainty caused by needing to rely on NGO support rather than the government. The next chapters will discuss available ICT resources, preparation of the ICT skilled teachers, various approaches of teaching and learning with ICT, and the impact of the 2015 earthquake on ICT use.

Chapter VI: Participants' Experiences of ICT Training

Introduction

The introduction of digital technology into primary teaching requires training of teachers to understand and use the technology. This chapter reports how the participants in my study experienced ICT training. The chapter examines how well the teachers felt they were prepared to use modern educational technologies in their instructional activities and examines the continuous ICT support they did receive. It also reports the teachers' attitudinal responses to teacher professional development, trainers and training providers. The participants' accounts identify that none of them received training about use of ICT in their pre-service training.

The development of teachers' skills to use modern educational technologies is currently one of the major aims of the professional development of teachers in Nepal (MoE, 2015). A similar priority has been articulated in international literature. For example, Donaldson and Knupfer (2002) argued that teachers need to be trained in a structured manner incorporating learning theories and new technologies in order to know how to use new educational materials and new learning environments.

In western contexts, online open information resources have made teachers' roles more sensitive and complicated. Teachers need both a dynamic approach and flexibility to involve learners in such an environment. Writing in a western context, Brown and Adler (2008) stated that there is no longer a clear demarcation between teacher and learner as the evolution of web 2.0 has shadowed the difference between consumer and producer of educational contents. This new environment requires different roles from teachers such as a facilitator, manager, coordinator, navigator or consultant. Thus, Mahmud and Ismail (2010) suggested that teachers need to be flexible and innovative when integrating digital technologies in instructional activities, so as to make their teaching efficient and to make learning fun and relevant to learners. King (2002) argued that, although it may become frustrating and intimidating for the teacher to learn to use technology, it is essential for teachers to develop some degree of technology skills to use educational technologies in their teaching and learning.

In the schools I studied, in-service teacher training was conducted through a Resource Centre by the Resource Person and the School Inspector. However, there are also regional, district and national teacher development programmes. Although the Resource Person and the School Inspector were the main trainers, other trainers were also appointed by the National Centre for Educational Development (NCED). All the participants in my study had received regular training through their resource centre and twelve participants from Annapurna School, Buddha School and Chadani School had completed ICT-integrated training conducted by the Open Learning Exchange. However, the participants from Dhaulagiri School were provided with only an initial three-hour orientation on how to search for digital contents in the digital devices that had been provided for the school lab. The participants from Ekata School stated that they learned to use the digital technology from their colleagues in the school as well as from refresher training that was provided by the Open Learning Exchange.

The participants in this study shared their experiences of learning to use ICT in their teaching. Themes that recurred within their discussion were their understandings of the need for ICT, their experience of government provided teacher training and NGO provided ICT training and their perception of trainers. The training schemes' ICT content are outlined in Figure 6.1.

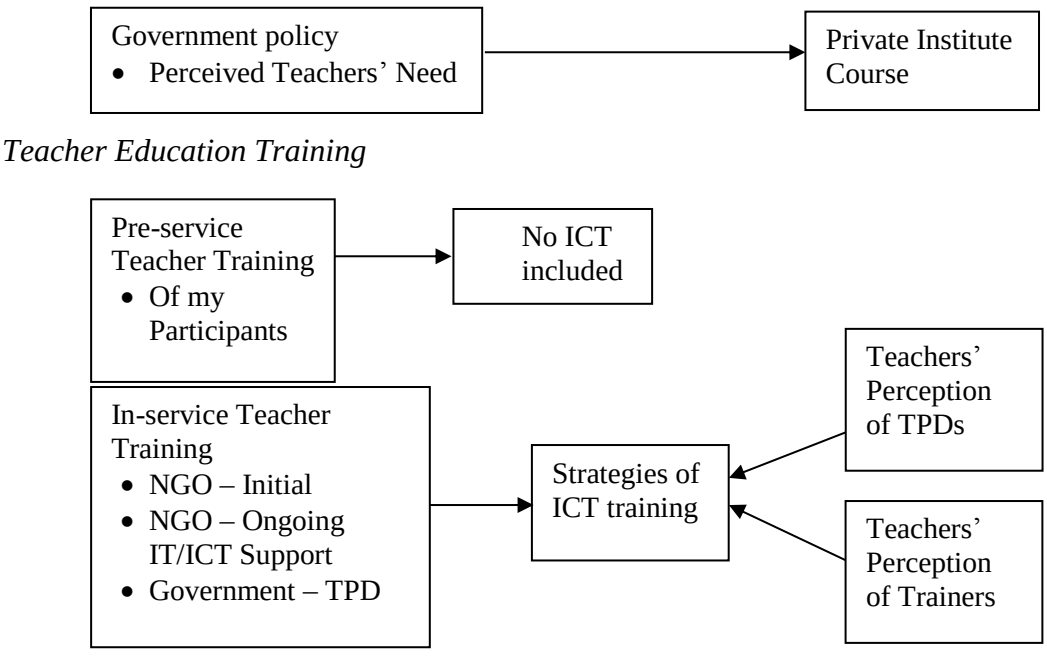

Figure 6.1: The general ICT training that participant teachers undertook

As shown in the above figure, the government's initial response to the perceived need for teachers to receive ICT training was to direct them towards courses in private institutes. The universities provide pre-service teacher training. The pre-service training received by the participants in my study did not include ICT. In-service training is currently being provided by the government and NGOs, sometimes introductory and sometimes on-going. This chapter discusses teachers' reaction to the training and trainers.

I had originally intended to investigate only the programmes that had been available to the participants, but, when the first interviewee criticised the quality of the trainer, a related question was added to the interview schedule for all subsequent participant teachers.

Government Policy of Teacher Training

When *Educational Rules, 2002* made the holding of a teacher license a requirement for application for teaching jobs, it increased the value of teacher training. Then, the *National Curriculum Framework for School Education, 2005* included an objective to integrate ICT into teaching and learning. It described the necessity of ICT training for all the teachers, as discussed in Chapter Five. The government developed a strategy to establish a relationship with NGOs for the provision of teacher training in ICT use. As the government opened the door for private investment in the school education, teacher training also became the responsibility of those private supporting organisations. However, although the government continues to conduct continuous professional development training for in-service teachers, I learned that the government does not have specific strategies for providing ICT training for teachers throughout the country. Therefore, the organisations which have been approved by the government to support ICT infrastructure also provide training to the teachers on how to use the technology in their teaching activities, as has been noted in Chapter V.

ICT in Private Institute Courses: Teachers' Perceived Needs

A brief history of computer use in Nepal provides information about private institutes which started to train people to use computer technology. The National Computer

Centre was established to train only government officials and store data. Then, the private training centres, schools and colleges adopted computers for their official tasks and began to teach computer usage which contributed to producing an IT-skilled workforce in the country. However, although the statutory national strategy of training teachers in ICT does not include private training centres, the history of computer technology development in Nepal shows that initially the National Computer Centre and then the private computer training institutes in the towns provided the current generation learners with an opportunity of learning how to use computers.

Many teachers learn to use ICT in their personal lives (Leask & Meadows, 2000), the same as other people do in the community. The history of information technology development in Nepal shows that the people who are ICT literate have gained their ICT skills and knowledge from private institutes. Although computer technology was first used to process the demographic statistics of the 1971 census in Nepal (Chapagain, 2006), it took another two decades to come to the common people. Since the establishment in 1974 of the Electronic Data Processing Centre, later renamed the National Computer Centre (NCC), training of a limited number of people has occurred (*ibid*). However, the number of private computer training centres in the cities greatly increased in the mid-90s. Gradually the private schools also adopted computers for official work as well as teaching basic skills. For example, when a private school where I used to teach in the year 1996 replaced its typewriter with a branded computer for typing examination question papers, it provided me with an opportunity of learning MS-DOS and basic Microsoft Office 3.0.

Interviews with the participants explored whether the participants had prior knowledge and skills of operating computers before the ICT training. The following table summarises their replies.

The table below shows that half of the sixteen participants did not have computer skills before they received intensive ICT training from the NGO which supported their schools with ICT infrastructure.

Table 6.1: Participants' Computer Training

Participant	Computer training before	Participant	Computer training before
Anuj	Yes	Chandra	No
Ananda	No	Chiran	No
Anita	Yes	Chitra	No
Asha	Yes	Chetan	No
Binod	Yes	Deepa	Yes
Bijen	No	Dinesh	Yes
Bhupal	No	Ekendra	Yes
Bikash	No	Elisha	Yes

Participants' comments also revealed that most of those who learned computer skills for the first time from the ICT training were reluctant to accept the offer of digital devices. However, those who had already been familiar with computers stated that there was a real need to accept the digital devices into their schools. For instance, Chandra from Chadani School recounted his experience of visitors from the supporting organisation coming to his school:

> When the people from OLE visited our school the second time, they called us into our office to talk about this technology. Then we sat together. They asked us, 'Can you give time for a week?' We said, 'Yes.' They didn't actually mention technology. At first they just asked for time. When they explained about the computers and teaching with them, we didn't reply straight away. We said, 'This is new for us. Can we use them? It may be very difficult for us. We don't know what there is.' Then they convinced us, 'We'll make you perfect in seven days and send you back to your school knowing how to use them.'

Chandra's statement reflected how he and his colleagues were initially daunted by their lack of technology literacy, and how they had felt as if they were being manipulated by the obliqueness of the communication from OLE. He acknowledged that they had felt some pressure to accept the technology, and had been swayed by the promise that they would learn everything they needed in the seven-day course. However, those who had prior computer skills before the intensive ICT training had a different attitude to the digital technology. For instance, Binod who had completed three-month computer training before he received the technology in his school, said:

> We got general information from the people. Simply, they said it is just a computer. We already had solar energy. They were happy to provide this technology and we were happy too.

His statement indicated that his prior computer training from a private institute gave him confidence to accept the technology in his teaching activities.

As access to ICT and its use are interrelated and interdependent, 50% of the participants had no computer skills before the NGO trained them to use computers and provided digital technology for their schools. Their responses indicated that they had no access to ICT in the remote villages, which will be further discussed in Chapter VII. The participants' initial perceptions aligned with the findings of Czerniewicz and Brown (2005) in South Africa that teachers who have had limited access to ICT would be less ready to use it in their teaching and learning activities.

The participants' comments indicated that private training centres had played a significant role in developing the digital technology skills of the teachers. However, there are limited numbers of private computer training centres and rural teachers have little access to them. The participants' experience of ICT training thus aligns with the globally-based finding of Pelgrum (2001) that there is a broad gap between the ideological plan of ICT training and its reality.

The participants who did have basic computer skills before the intensive ICT training (50%), indicated that they still did not feel confident to use ICT in various subject classes. Although most of them had refresher training annually, they explained that the training was highly focused on classroom management issues they had been facing, rather than boosting their technology skills. When listening to these responses, I remembered King (2002) who found that ICT training was often unable to cover issues related to personal and professional technology development and would focus on the theory of how educational technology could transform teachers' pedagogies. There seems to be a continuing challenge in how to make ICT-supported teacher professional development (TPD) productive.

Gaible and Burns (2005) found that a further challenge lies in schools where there is lack of adequate electricity, classrooms and textbooks. Another issue of ICT-integrated professional development of teachers is that it often relies on the teacher

being a *digital native* (Selwyn, Potter & Cranmer, 2010), and so already familiar with various forms of ICT beyond school classrooms. However, the majority of participants' responses in this study, as well as field observation, indicated that the teachers had very limited access to digital technologies in and outside the schools, and so did not have opportunity to learn to use ICT in their everyday lives.

Pre-service Teacher Training Courses

Among the nine universities in Nepal, four (Tribhuvan University, Kathmandu University, Mahendra Sanskrit Vishwavidhyalaya and Purbanchal University) have teacher education programmes (Dhakal & Pant, 2015). Tribhuvan University, the oldest in Nepal, and Kathmandu University are the main universities which train school teachers. These universities have affiliated community campuses in different parts of the country. In addition, there are private colleges which run the university courses. However, teacher education courses are conducted only by the universities on their main and community campuses. Students must complete school-based training as a six-week practicum, for which the campuses collaborate with the government schools.

As discussed in Chapter V, although Bachelors and Masters of Education programmes in Tribhuvan University include ICT in Education as separate courses, the courses are too technical for general use in teaching (Dhakal & Pant, 2015). However, the Masters of Education programme in Kathmandu University emphasises strategies of integrating ICT in various subjects. Voogt, Erstad, Dede and Mishra (2013) stressed that the trend of globalisation of education makes it important for teacher education programmes to cover integration of ICT as preparation for the 21st-century digital world. They argued that new millennium teachers need to be prepared for new pedagogical approaches to fit an innovative society, and they need to understand how ICT and pedagogy interrelate to facilitate learning in their students. Therefore, teacher educators need to prepare prospective teachers to navigate technology, pedagogy and content in multicultural, transnational and heterogeneous classrooms in the 21st century (Liu, Baker & Milman, 2014).

However, participants in this study stated that their teacher education courses did not cover the use of ICT in teaching and learning activities. Their responses did reflect an

interest in learning new technologies and how to use them in their classroom activities. Several participants criticised the pre-service teacher training programmes. For example, Anuj complained: "There was nothing about ICT in the campus course. There was nothing about it." His complaint implied his belief that teacher education should cover the use of ICT in teaching and learning. He then further argued that teachers need to have basic technical computer skills to know how to operate programmes, practical experience in manipulating ICT, and pedagogical knowledge to know how to teach with ICT. He expressed appreciation that his training course had covered classroom management, strategies for motivating children, and various teaching methods and techniques.

In a similar vein, Deepa valued aspects of her pre-service teacher training. She said: "It teaches how to teach, how to make plans and prepare materials according to the level and interest of the learners." However, she criticised it for not covering ICT integration in teaching and learning:

> When we brought a computer to our school, I bought a smart mobile. My brother was far better in technology. I learned how to use a computer from him. There nothing about it in my college course.

She expected that her university course should have taught her how to design her lessons with ICT, and she considered she would have performed better in her classroom teaching if it had.

Dinesh reported similar experience in his pre-service training:

> I learned to use a computer from a private institute. That helped me to explore digital contents on our school server. There was nothing about ICT in our college course.

He said that given the expectation on teachers to use technology, he would have expected his training to have helped him develop a high-level efficiency in using ICT for his daily classroom teaching.

Participants talked about the pedagogy and psychological learning theories they had learned in their teacher training. Several made connections between the general principles of learning and teaching and the use of ICT in teaching activities. For instance, Dinesh from Dhaulagiri School emphasised that "no matter what subject you

teach, teachers must understand the child psychology while teaching. It is a mental job."

Elisha from Ekata School reflected on her initial teacher training and remarked that teachers with a background of teacher education had been taught skills of involving students in different learning activities. However, she perceived that the teachers without that background mostly just delivered lectures in the classroom. She explained:

> Those who are from teacher education have different ways of teaching than other teachers from the commerce and science faculties. There is a huge difference. We think of how to engage the children in various activities and teach skills, but they mostly deliver a lecture. I've seen that even in this school. They speak too much and ask the children to go through books. They even write the answer on the blackboard. That's their way of teaching.

However, she recollected her initial unpleasant experience of using digital devices. She had struggled to understand the technology and integrate it into her classroom teaching. She wished that she would have gained knowledge and skills of using ICT from her pre-service teacher training course which she believed would have supported her in using digital devices in her classes to fulfil the needs of the students.

Elisha's comments align with Tezci (2009) who suggested teachers need to have knowledge of pedagogy and skills to engage children in learning activities, including how to use ICT to enhance learning. Tezci also argued that while in general pedagogical knowledge applies to ICT as well as to other subjects, the use of ICT requires the acquisition of specialist knowledge and the learning of additional skills.

The participants' experiences of needing to learn how to use ICT in their instructional activities after they had begun teaching suggested that the existing pre-service teacher training programme needs to be revised to include the uses of technology, and particularly ways to apply ICT in teaching and learning activities. Komis and Jimoyiannis (2007) also argued that pre-service teacher education must develop a culture of using ICT among teachers. A number of further studies, such as Goktas et al. (2009) and Gülbahar and Güven (2008), emphasised that teachers' attitudes determine the successful integration of the technologies in teaching and learning and

so university ICT labs should facilitate prospective teachers' use of available ICT in their pre-service teacher work and later in actual teaching in schools. However, the pre-service teacher education courses in Nepali universities are not yet providing an environment of using digital technology. Teachers learn to use digital technology from private training centres in the towns.

ICT-integrated Teacher Training: NGO Training

The participants in my study received training on ICT from an NGO which supported their schools with ICT infrastructure. As discussed previously, although the Government of Nepal has a policy to integrate ICT in education, there is still no specific strategy of implementing the policy to equip community primary schools with technology and to train the teachers to use ICT in their teaching. However, the government has allowed various NGOs to work in that sector. For example, Open Learning Exchange (OLE) signed an MoU with the Ministry of Education in 2007 to develop ICT infrastructure in rural primary schools and train the teachers of those schools. The government appears to be distributing responsibility to other organisations and communities and to be avoiding investing a considerable budget in ICT infrastructure and training programmes in schools.

The question of when ICT training should be provided has been problematised in some literature. Gaible and Burns (2005) claimed that, in many cases, ICT will not make teacher professional development (TPD) programmes better, rather the integration of such technologies can make the programmes worse. This is more likely to happen in developing countries like Nepal where the schools are located in remote villages with limited contact to the centres of support and the schools have only refurbished computers that are unable to run the new programmes and cellular mobile phones with only 2G network connections. In that situation, teachers and students become frustrated due to the time that is wasted in making connections and often give up trying to use technology (González-Lloret, 2014). Donaldson and Knupfer (2002) argued that teachers need to be trained to solve predictable technological problems when using digital technologies. In the sections that follow I report how the participants in this study talked about various aspects of their ICT-integrated teacher training.

Introduction of Technology into Training

Bessenyei (2008) stated that formal training in how to use ICT in instructional activities develops confidence in teachers. Mahmud and Ismail (2010, p. 10) affirmed that "the formal ICT training and ICT experience influence the teachers' knowledge, skills and attitude", and so participants' perceptions of what they had learned as well as their attitudes are important to this study. The participants' various responses indicate that they had learned to operate the devices, search for digital contents, prepare lessons and deliver the lessons in their classes. As noted above, half of the participants had received prior basic computer training from private institutes before their one-week intensive training provided by the supporting NGO.

All the participants from Buddha and Chadani Schools were trained to use digital devices in their various subjects before digital technology was installed into their schools. Similarly, the participants from Annapurna School, except for Asha who had just attended refresher training the previous year, did training before receiving the technology into their school. However, the participants from Dhaulagiri School only received a one-day orientation from the trainers of Open Learning Exchange. Elisha from Ekata School received computer skill training from the District Education Office several years before I interviewed her. However, Ekendra, also from Ekata School, explained that he learned to use the digital devices by watching the activities of his students and by self-practice. He explained:

> When I came in this school, every child used to take their devices home. Even I was surprised and I had a curiosity how to use them in my teaching. I used to ask my students to work on their devices and I used to watch what they did. Then I started to use the device and learned. I used to carry one with me.

Interviews with the participants identified that the NGO which supported their schools with laptops, server, e-library and curriculum-based digital contents trained them to use the new technology in their classroom activities. The interviews also revealed that the purpose of the formal ICT training was to develop basic as well as advanced skills and to motivate the teachers as well as students to learn with such technologies outside the school.

Training Experiences

Some researchers e.g. (Bradshaw et al., 2012; Kalogiannakis, 2010; Vratulis et al., 2011) found that integration of ICT into teacher professional development programmes have remodelled the role of the teachers in teaching and learning, reformed learners as peers and transformed learning as collaborative work. Bessenyei (2008) argued for the need, especially when teachers are new to computer technology, for ICT training to develop core and advanced skills so that they can operate devices and access digital information. A teacher using ICT, therefore, has several roles such as mechanic, technician, artist, facilitator, as well as teacher. Participants indicated that they had learned how to operate a computer, how to prepare an integrated lesson plan combining digital contents and the textbook, how to teach different subject contents with digital devices, and how to solve predictable technical problems.

The following pages report what participants said they learned from the training. How they used the strategies in their teaching activities is reported in Chapter VII.

Basic Computer Skills

The participants commented on the core computer skills they acquired in their one-week intensive training.

> Bikash: OLE provided one-week training before we got this lab. In seven days we mostly did the computer activities like how to open the programmes, search information, shut down the device, like that. What computer skills do we learn in seven days? We'd never seen this before. We didn't expect we could learn to use this device in teaching and learning. However, we learned how much we had to learn, and they made us perfect to use the devices at the end. This mobile in my hand lasts seven years. That's all.

> Bijen: They provided seven-day training. If we missed one day, we wouldn't be able to learn. So, we were engaged from 9 a.m. in the morning to 6 p.m. in the evening every day.

> Bhupal: In seven days mostly we did the computer activities like how to open, search information, shut down the device, like that.

It is noteworthy that Bikash did not expect everything in this course, he accepted this was a start for his learning, and although he was initially unsure about how to use the

devices, he was able to build up confidence and take some responsibility for learning more himself. Bhupal also expressed his appreciation that the training was his first opportunity to learn to use a computer.

These participants' expressions about their experiences of learning to use digital technology reminded me of the finding of Selwyn et al. (2010): that many teachers experience the potential of such digital technologies to support and excite their teaching and learning in the school classroom.

The participants from Chadani School reported similar experiences.

> Chitra: Honestly, I didn't know how to open computer. Yes, I did simply like using mobile phones.
>
> Chetan: If it had come in our time, we would have good knowledge and skills of the computer. It came later, and we are late too. We are ourselves not perfect and that much confident. Before they provided the devices, they provided seven whole day training. That was basic computer skills of how to open, shut down, copy texts, download, and other essential things. Still, at least we know how to open the devices, teach lessons with them and shut down the devices.

Chetan's comments on the initial ICT training raised concerns about whether the training was not helpful to enable him to use digital devices or he lacked self-efficacy. I wonder whether or not he tried to develop his technology skills when using the technologies in the lab. However, Haddad and Draxler (2002) argued that one-shot training, no matter how effective, cannot tackle all the challenges that teachers face. They suggested that teachers need to be provided with continuous professional development that consists of initial training, upgrading skills and further support.

Anuj from Annapurna School reported that he learned both from the course and from practising with his daughter:

> I had already had basic skills. There was one-week training before we brought the computers. When the training was over, we brought them from Nepalgunj. I have realised that knowing how to use the computer is learned by doing, more than through classroom teaching. I have a daughter who is six. She goes to school with me. I mostly go to school early to use a

> computer if there is electricity. She asks me if she can use the computer, and I allow her. She is learning herself. She can type her name and other things.

Anuj reported that his daughter was learning computer skills simply by using the computer in her father's company. He found too that he learned more by setting aside time to practice regularly. When listening to his experience, I reflected in my field notes and recalled Bjerede et al. (2010), who noted that when the teachers can get access to digital technology, they can learn to use those technologies in their flexible time during school or out of the school time.

In comparison had Anita tried to utilise her time, as Anuj did, to keep up to date with technological skills, perhaps she would have maintained her technological skills that she had learned from the three-month computer training. She explained:

> I have done basic three-month computer training while I was doing my B.Ed, but I forgot most of it. I forgot most of the skills. I can't open the office desktop. Other colleagues use this technology. This lab was here when I came. Other teachers taught me how to use them. It was not new. There was refresher training. They were asking teachers about their problems.

Anita's experience of using the computer after a long time gap from completing her three-month training suggests that the teachers need continuous mentor support and collaborative relationship to refresh and keep updating technological skills. When listening to her talk about the loss of confidence in using digital devices and need for refreshment of basic technology skills, I recalled Ross (2011) who has suggested that the continuous refresher training, regular use of the technologies and peer support help teachers update their technological skills.

Preparing an Integrated Lesson Plan

The majority of participants in this study expressed the view that ICT training had provided them with an opportunity to learn to use digital devices in making their teaching plan and in classroom delivery.

> Bikash: The training focused on the use of digital device but we equally learned to prepare plans by using both this device and the textbook. There is the situation I have to teach the same content twice - once in the normal class and another here in the lab. There are many more different activities here on this device than in the textbook.

Binod: They informed us there are different digital contents from the textbooks. They are not exactly the same here. You have to search the contents in the device and teach them.

Bijen: The children read the textbook contents and then they also do the activities on the devices. It's not the same as the book is. This has digital contents but the hard copy book is different.

Bhupal: Children need those hard copy books too. They do activities on devices. This device does not meet the objectives of the curriculum in the same way as the textbook does. This is only a teaching material to enhance textbooks.

Bikash reported that the initial one-week training in ICT had emphasised the skills of collating contents from two different sources – the printed textbook and the digital device. However, he acknowledged that he found himself teaching the same content twice. He tended to teach a topic from the textbook first and then when he could access the lab, he would find many more learning activities on the device and so would teach it again.

Bhupal, on the other hand, seemed to have made personal sense of the two sources and looked to the technology devices to provide him with means of enhancing learning, whereas the textbook provided him with course content.

Teachers from Annapurna School reported that their first one-week training in ICT had made them able to search for digital information on the server, prepare integrated lesson plans by collating textbook and digital contents, and use available digital contents in their classroom.

Ananda: Contents in textbooks and digital contents are different. How to integrate them is a difficult job. They trained us to use both of these as teaching materials.

Anuj: Trainers trained us how to teach matching the textbook and digital contents in the classroom.

The participants from Chadani School expressed similar experience of their initial one-week training as had the participants from Annapurna and Buddha Schools. For instance, Chiran reported: "Actually all the digital contents are not exactly same as

textbook contents. We use both." His comment indicated that he had learned strategies to organise both sources in his instructional plans.

However, the participants from Dhaulagiri and Ekata Schools criticised the training in various ways, as discussed in the following section.

Learning to Use Digital Devices in Teaching

Many participants reported that after initial reluctance, after training they became more confident about how to use digital devices in the classroom.

> Bikash: At the beginning we learned to operate this device and then how to use it to teach different subject contents. There was focus on teaching methods and how to integrate this technology with them. What can we learn in seven days? We might have forgotten. Suppose we learned how to draw this picture, but it is hard to colour the pictures. They demonstrated different ways of colouring pictures on the device.
>
> Binod: OLE provided one-week training before they provided this technology for our school. We learned to operate the laptops, search contents on them and find e-library books on server.
>
> Bijen: This was all about computer skills and how to use the computer in our teaching. When we learned basic computer skills, they trained us to present lessons using these devices. In this device, there are already materials.
>
> Bhupal: They trained us to use these devices to teach different subject contents. How to go to *e-paath* and how to teach different contents using various materials available here. It is not that a difficult thing to handle this device. There were some computer skill courses but especially it was about *e-paath* and e-library. *E-paath* is a broad platform that covers more than textbooks.

These participants reported that the training allowed teachers to use the technology in their ways in the classroom rather than focusing on just one particular pedagogical approach such as self-learning or collaborative learning. Their comments also indicated that they had strong commitment and enthusiasm to learn to integrate new technology in their pedagogy which, according to Kalogiannakis (2010), is what training should focus on. Granger, Morbey, Lotherington, Owston and Wideman (2002) similarly agued that simply providing knowledge of ICT and limited skills might not help teachers enough in their actual classrooms. They contended that open

access to ICT, such as internet surfing, browsing different websites, video-chatting with others, playing with videos and games can have an explicit and implicit influence on the teachers' technology learning.

Most of the participants from Chadani School reported that the initial one-week ICT training was productive for their classroom teaching; they had learned to operate the devices as well as use them in their instructional activities.

> Chandra: We did well and came to the school. All the teachers from our school attended that one-week training. We could then use the laptop in our teaching activities. They specially taught us how to use e-paath and e-library.
>
> Chiran: All of us worked hard to get every skill in that training.
>
> Chitra: Honestly, I didn't know how to open computer but the trainers confidently said they would make us perfect in a week to use these devices in our teaching and learning activities. Then they provided one-week training during the holiday, and we did that at the end.

Chetan, however, who had been using the digital devices for six years by the time of our interview stated that he had not been able to further develop his ICT skills even after the initial training and subsequent refresher training session. Perhaps, as Bradshaw et al. (2012) found in their study, his learning attitude blocked further development of his ICT skills; perhaps the trainers did not help him enough, or perhaps he had limited access to ICT in daily life as will be discussed in Chapter VII.

Ananda from Annapurna School commented not only on what he had learned but also on his confidence that those who had taken part in the training could teach new teachers. He explained:

> We were five from our school in seven-day training in Nepalgunj. Two of them left the school. We can train other new teachers too. They can learn in a couple of days. Students use them, but the teacher must know the contents. I haven't done any computer training before.

However, there were criticisms of the three-hour orientation training. For instance, Deepa from Dhaulagiri School criticised the three-hour orientation to accessing digital contents:

> Exactly, there was not special training to use the digital contents. Two people from OLE stayed one night at my home and came to the school and demonstrated things in about three hours. Just lightly instructed us how to open materials, move items, and close them. Teachers who had technical knowledge got the idea, but others did not. In most of the cases, we are backward in computer skills. We know nothing. Later they called enthusiastic teachers in one place from different schools in our VDC, but none attended. We requested them to come back but they never returned to our school though they said they would return later.

Deepa's comments express her frustration; she has interest in learning how to use ICT in her practice rather than just being given rudimentary technical information, and the technical information that was offered was delivered much too fast for her and some of her colleagues. She was disappointed that the team did not return to give more training.

Elisha from Ekata School also criticised the lack of pedagogical content in the training she received:

> I got an opportunity for training in basic computer skills from the school. After a long time I got ICT training from DEO. There were teachers from twelve schools. They talked about teaching lessons using computer technology but it was more about how to store school data on software. We prepared a simple plan, slides and presented in the hall. It was not a very effective and practical activity. Government projects are like that. They just taught us how to fill in the data and how to keep children's information.

She was disappointed that, although her training included activities such as preparing a lesson plan, making PowerPoint slides for a presentation, there was a minimal exploration to how to use digital contents in teaching. Her criticism included a generalised indictment of the ineffectiveness of government training. Her criticism is echoed by the conclusion of Khan et al. (2012) in the context of another developing country, Bangladesh, that the misuse of government funds had been one of the strongest barriers to the implementation of ICT in education.

Fixing Technical Issues

Participants in this study also reported they had learned how to address minor technical problems that might commonly arise with their devices.

Binod: They trained us how to solve general technical problems, like how to reset the server, how to connect to the e-library, how to solve device hanging and other necessary skills.

Other participants reported they were still facing general technical problems when they used the digital devices in their teaching activities.

Bhupa: There are technical issues like sometimes the device hangs and then the student has to move to another device. It takes time to open another device and learning activities will be disturbed.

Bikash: Sometimes the device charger does not work. Sometimes it does not display all the contents, like level one to seven. And another problem happened the other day: we could not draw the shape.

Several participants, however, reported that the one-week training in ICT had taught them how to safely handle the devices and fix general problems.

Anuj: I have not found big issues in using these devices. There are technical problems like server disconnection. Students cannot get access to e-library. Other problems, like going slow while using, hanging, dim screen. We learned how to solve these general issues in training. Trainers also focused on how to handle the devices in the classroom and keep them safe.

Chiran: We solve general issues ourselves. Trainers in the training taught us how to do that.

Chitra: Sometimes some of the contents are lost from one device but we recover them from other devices.

Most of the participants reported that the training had covered a wide range of ICT competencies. In addition, the majority of the participants reported that they received continuous support to solve major issues with the digital devices from agencies that had provided their computers.

IT/ICT Support for Teachers

The schools in my study are community schools in remote rural villages. Although the mobile phone access in Nepal has crossed 90%, internet access is limited. Because they are business oriented, internet service providers are concentrated in the cities and towns, but not in the villages. Although the recent record of internet and mobile data

subscribers has now crossed 58.72% of the total country population, the majority of them (95%) are mobile data users (News24Nepal, 2017 September 1; retrieved 2017 September 11). This indicates that teachers in rural schools and the schools may not be able to afford the expensive facility for general educational activities. Teachers in rural community schools have limited access to support centres or ICT specialists. Therefore, while it has become relatively easy to get some kind of computer technology in schools, keeping devices functional is, as Hawkins (2002) found, a challenge.

Participants in this study reported that they had two means of getting support from the IT/ICT specialists who had provided their equipment. Firstly, they would use their mobile phones to communicate their problems to the trouble-shooters and possibly resolve the technical difficulties they were facing in their classroom teaching through instruction over the phone. Secondly, the specialists would visit the schools according to a pre-arranged schedule.

A majority of participants stated that they expected professional development programmes to be comprehensive in covering the problems of school teachers and provide them with continuing support as required. The participants reported that they were receiving consistent support from the specialists of the sponsoring organisations.

> Anuj: We're expecting more support from OLE Nepal. They're supporting our school a lot. They repair devices and update programmes.
>
> Anita: Most of the time we call the office and get some ideas. Other teachers solve minor problems.
>
> Bijen: Two volunteers stayed in this lab for about three weeks and supported us immediately after the initial training. They helped in our classroom practice of digital technology and developed our confidence. We could use the devices before though I can't say I was perfect. Then, after the volunteers worked with us, we could confidently use them.
>
> Bhupal: After the training, two volunteers stayed with us here a couple of weeks to support us in the class. They helped us fix technical problems with the devices. When we get more problems, we talk to technicians over the phone and get help. If that doesn't work, they come to help here.

These responses from participants indicated that, although the schools did not have

ICT specialists in their school, the organisation which provided the new technology provided consistent service to the schools. The participants' satisfaction finds a resonance in the studies by Donaldson and Knupfer (2002) and Jong (2012) though in a different context, who found that support from experts created a comfortable environment for teachers using technologies in their regular teaching and learning.

However, in the case of Dhaulagiri School, the participants were critical. They complained that they did not receive support from the organisation which provided the digital content programme for their school. Although teachers from other schools reported they had been receiving distance as well as in-person support, Deepa expressed her frustration at not getting sufficient ICT training or further technical assistance to use the new technology effectively. She complained that, although her school had requested the trainers who had given the first three-hour induction to return, they never returned to her school though they said they would return later.

Deepa's interview responses consistently expressing her frustration with the lack of technological support, are consistent with the findings of Dawes (2001) and Ertmer et al. (2012), who found that a lack of training and consistent support for the teachers in the practice of ICT in the classroom leads to decline in the teachers' interest in using technologies.

The extent to which participants were satisfied or dissatisfied with the IT support they were receiving, thus varied considerably according to their school. The teachers from Dhaulagiri School felt they had been neglected. The majority of the other participants in this study stated that the continuous organisational support had enabled them to use available digital technology in their instructional activities consistently.

Government provided TPD and Teachers' Perceptions

As well as their specialised ICT training, all the participants in this study received more than one session of continuous professional development training.

In the rapidly developing social, economic and educational environment of a country like Nepal, pre-service teacher training alone cannot fully prepare teachers; it needs to be augmented by in-service continuous professional development training programmes (OECD, 1998). Connell (2013 December; retrieved 2017 April) asserts

that the professional quality of teachers already in teaching needs to be continually improved to enhance the quality of education. National Centre for Educational Development (NCED) under the Ministry of Education is responsible for generic in-service teacher training in Nepal. NCED, established in 1993, develops training programmes for early childhood, primary and secondary school teachers and conducts training in the schools (NCED, 2017). However, the training does not cover ICT integration in pedagogy. NCED organises teacher professional development (TPD) for teachers through Resource Centres where the Resource Person and the School Inspector conduct regular training, as discussed in Chapter V. However, there are also other regional, district and national level training programmes.

In the interviews, participants reported their experience of teacher professional development courses and what they had learned from them. The majority reported that they appreciated the training and had learned various teaching strategies.

> Anuj: Mainly the training focused on how to diagnose the problems of children, find the problems and treat them. Definitely training is supportive in daily teaching, but it depends on how teachers apply them. It depends on the teachers whether they apply them or not. In my case, I try all that I can. TPDs mainly focus on the issues or problems that the teachers face daily in their teaching and learning activities.
>
> Ananda: I didn't know how to prepare lesson plans, find objectives and materials. That training was really productive. Trainers used to ask us to teach in the training hall and most of the time in real classrooms. In the first training they just asked us to teach for one week but here the real practice was higher. When there was no school, we used to do peer teaching in the training office. They taught us to use different methods and techniques in teaching and learning. We had been placed for forty-five days in different schools for teaching practice.
>
> Anita: More training can develop our teaching skills.

Anuj acknowledged that the success of training relies on the way an individual teacher applies the learning in the classroom. Both he and Ananda expressed appreciation that they had been taught new skills and were given opportunities to practice them in the training. Their expression in our interviews reminded me Cheng (2016), who found that in-service teachers' professional training improves their

competences, facilitates students' learning and enables them to tackle various challenges related to teaching and learning.

However, Bhupal from Buddha School expressed a different experience. He discussed the professional development training he had received during his 29-year teaching career. He expressed appreciation of the training programmes in his early career, but he criticised the more recent training organised in resource centres by the Resource Person and School Inspectors. He argued that the Resource Person (RP) and School Inspector (SI) never visited his school to support him and his colleagues. He explained:

> I've done ten months training. That was in four different packages – two and half months in the training centre, the next two and half months on radio, the third was similar, and the last in a training centre. I couldn't learn much out of these trainings.
>
> What I learned is from one month training that I did twenty two years ago. I really got a good opportunity to learn then. There was no electricity those days. We used to use candle light or a kerosene lamp or a lantern in the night. That one month training was basic for primary teachers. It was such a training where you couldn't go away without completing the task. I had to do anyway. Not allowed to sleep without doing that. We used to prepare a lot of materials every day. *Do that* means do it. They provided food and a sleeping bed. There was no allowance. They provided pen and paper to prepare all the materials.
>
> These days, there are subject-specific training programmes in the resource centre. The Resource Person is a generalist who knows little about the specific subjects. There must be a subject-specific trainer, not a trainer who knows nothing about English but delivers training in English. Next thing, the RP and the SI are permanent staff to support school teachers. They live there in the Resource Centre permanently but never visited our school. Look, they have not signed the school register even once. Why? They are useless.

However, Bikash, from the same school stated that training provided a range of skills to prepare lesson plans, design materials and develop new teaching techniques: "Some of the trainings were really good. We had to prepare lesson plans, materials and deliver lessons in the groups."

Bhupal's argument reflected that most of the current training programmes were not effective due to the lack of specialist trainers in the Resource Centre. His argument

aligns with the findings of Fairhurst et al. (1999) in the context of India, Kenya, Nepal and Zambia that, although there was a need for resource people in resource centres to support surrounding schools, they needed to be well-trained to run the training programmes. Yogev (1997) found that developing countries suffered a scarcity of specialist trainers. I wonder whether or not the training programmes are evaluated in Nepal, but it has created a reservation such and that described by Dyer et al. (2004) in the neighbour country India who found that none of the training programmes' impact was evaluated at the completion of training or after the teachers returned to their schools. Bhupal's comments also reminded me the findings of Uysal (2012) in the context of Turkey, that in-service teacher training programmes should consider the teachers' needs and contexts.

Participants from Chadani School had a range of opinions about government training.

> Chandra: Formality. Just gossip, useless chat in the training. But still I have to go there. There is one in April about action research. I am sure that is also going to be like that.
>
> Chiran: Obviously training is good. I have initially done ten-month training and then many more.
>
> Chitra: Training is supportive. We learn something new skills from the programmes and it makes us professional. It has brought a lot of change in my teaching and learning activities. They are supportive. Something we learn new. Student-centred activities are very useful. Training makes teachers professional. There were various activities we were involved in.

Chetan criticised the model of the training programmes:

> Trainers can act as teachers in the training hall where we trainees can be students, but this is not going to work in real classroom. We're different than the children. We know everything, but the children are the real learners. We can respond immediately but this cannot be the real thing. This is just an acting role. Training should be in the real classroom in a school. Trainers should come into my classroom and train me there. That is going to work very well. Otherwise, training among just trainers and trainees in a centre does not become effective. Such training programmes are just for formality.

Chandra criticised training sessions for the waste of teachers' valuable teaching time in their schools. Chetan argued that he could not reflect his training in his real

classroom teaching. He wanted training to be conducted in real classrooms in schools. However, Khaniya and Williams (2004) argued that the training packages in Nepal were developed to enable teachers to gain teaching skills from a centre training that would influence their real classroom teaching. Chetan's thoughts about changing the Resource Centre training model to on that is school-based align with the finding of Hardman et al. (2009), that teacher training model in Kenya was more productive and effective when it became school-based. Saigal (2012) in the context of Indian rural state primary schools found that top-down inspectorial, pre-determined and framed training packages failed to cover the context and needs of teachers. Leu (2004) in the context of Ethiopia found that, although cluster model training played a significant role in teachers' professional development, such in-service training frequently took place in the context of a geographically complicated environment where the teachers had to come from dispersed schools in remote areas. He found that school-based in-service teacher training was more effective because the teachers became more reflective practitioners who could apply their knowledge and a range of practical approaches in their own classrooms.

The teachers from Dhaulagiri and Ekata Schools also had divided opinions.

> Deepa: I have done ten-day training, many modular training courses, and almost all. Nowadays, I am fed up with training because whatever the training we do it is not followed well. I do it for about two months. Then, I feel frustration because other teachers don't carry it out. When other colleagues do not work well, that kills my will and interest. If the colleagues work together, that inspires everyone to do the work well.
>
> Dinesh: TPDs support us on the go where we have problems in daily teaching.
>
> Ekendra: Some of the trainings are refreshers. The seven-day training was special for me. This was all about psychology, how to treat the children. That made me really different after the week. Like the one issue down in the meeting today, one boy goes to work in catering who is in Grade eight. 'Why does he go to work?' is a major issue. There is some problem with him. The more we mix with the children the more they become friendly and share their feelings. They share problems and learn more from me. That training brought this kind of

> behaviour in me. Children don't do homework. Why? Such problems are frequent in the school. We learned how to solve such problems.

> Elisha: Early childhood development training was really good and productive. It was actually about being a child, I mean how to engage those three-year-old children – being like them. We did singing, dancing, knitting, filling sand in pots and so on exactly what children do. More than the training, there was one lady teacher here before. I learned a lot from her. I never expect anything fruitful from such government training.

Although the majority of participants' expressions reflect that the generic professional development training programmes were helpful in their teaching activities, some complained about the trainers at Resource Centres who they thought needed to be themselves well-trained to train other teachers. Others, for example, Chetan expected that the school-based professional development training would be a more effective programme.

Criticisms of TPD and trainers

While most of participants in this study appreciated receiving professional development, they had a number of criticism of trainers. Many of them spoke positively about the one-week initial independently run ICT-integrated training and the annual refreshers, and those who did not receive it were unhappy that they had been given a more cursory introduction. There was more criticism of the government programmes. For instance, even Anuj who had acknowledged, as reported above, that he learned a lot about teaching processes from the government's courses, argued that generic training without ICT integration was not satisfactory. He explained:

> Honestly saying, I haven't found such training very productive when we talk about the huge investment of the state. I don't think such training is brought into the classroom. But in *e-paati* training they taught us how to use the devices in our daily classroom. Many teachers did not know computers before. They trained us how to open and shut down the device, search the class, subject and contents on them. Almost every day they focused on these basic skills. One important thing, we learned to prepare integrated lesson plans that could cover digital contents and textbook contents. They also focused on how to handle the devices in the classroom, keep them safe.

While he had acknowledged some learning, Anuj seemed to have two major criticisms of the government organised professional development: that it did not

integrate the ICT skills that the government insisted they develop in their teaching and so was not seen as leading to the expected changes in practice, and that it did not offer enough value for the money that was allocated to it in the budget. The issue of cost-effectiveness is one also raised by other researchers, such as Pelgrum (2001). The quality of trainers was one area that was seen to be inadequate, as Anuj later explained:

> I can also be a trainer. The DEO selects some school teachers and trains them for four days and sends them to train others. But the ICT organisations have their specialists to train teachers. It is easy to recognise them from their behaviour, the way they deliver trainings.

Others also criticised the quality of trainers, the poor quality of communication, and dishonest practices.

> Deepa: Rather than dying in summer heat, I felt I should be teaching my own lessons in the school. There was no point just gathering in a room and making noise among other school teachers. For me, teaching in school is productive rather than wasting time in unproductive training. Training depends on the trainers too. In some of the training, trainers and even trainees were negligent. Even trainers wanted to finish the five-day training in shorter period like two days and some of the trainees used to attend the training just two days or three days and sign attendance register of five days to collect allowance.

> Ekendra: Professionals should be something different. I don't know if they are just killing their time. They might be qualified, but I don't know why they were not so active trainers. It might be their age and traditional education system too. They are appointed by DEO for training, but the reality is different I found.

> Ananda: Here the trainers are local teachers selected for the training. I haven't found productive training. Both trainees and trainers take it lightly. They are not experts and do not seriously run the programme. They say, 'All of you are at the same level. You can do it.' In my case I am serious in learning. Their negligence kills our interest too. In the training of Nepalgunj, the district headquarters, they were good trainers. They were subject specialists. Trainers practically demonstrated examples like photosynthesis, bridge engineering, etc. Especially Surkhet training was the best. Trainers were very sincere and expert in involving trainees in activities.

> Bhupal: There are TPD courses regularly. There's no letter to the schools these days. They inform people on phones. Those who get the phone call they go to the training but others who have lost phone connection do not. I don't think the aim of training is wrong. I've never found the training was really productive where the trainers were really responsible.

Ananda's differentiation between the local trainers and those at district headquarters underlines the difference that skilled trainers make to trainees. It also identifies the hasty training many of the local professional development trainers themselves were given. There is still a gap in expertise with TPD programmes, especially in delivering to rural areas.

Bhupal's criticism highlights the gap in communication about courses that makes many rural teachers feel they have been dropped out of the system. Although there is an official procedure to deliver notice to the schools giving staff sufficient time to prepare for the training, the Resource Person and the School Inspector, who are responsible for organisation, are seen to be failing to manage allocations and communications effectively. Deepa reported that trainers in her district had held a register for five days, thus collecting pay for five days, but closed down the course after two days. She reported that some trainees were guilty of similar practices. Misuse of training allowance is a further complicating factor in the provision of TPD.

Other participants acknowledged the pedagogical skills they have been informed about in their TPD, but also criticised the trainer's process.

> Bikash: Some of the trainings were really good. We had to prepare lesson plans, materials and deliver lessons in the groups but they mostly gave lectures to the teachers. I used to have a feeling if he did it another way, it would be better. If they motivated us, we would do the same in our classroom. In the ICT training, they demonstrated how to use e-library and other applications. You can teach this way, that way they demonstrated teaching activities in the training. I liked that training.

Teachers who participate in in-service professional development are often experienced in classroom practice and come with high expectation of learning new skills. Thus, TPD loads considerable responsibility on the trainers for preparing a cohesive training schedule, relevant content and for having the skills to fulfil the

needs of the trainees. It is essential for the trainers to understand the experience of the trainees in the training. Trainers' professionalism lies in being able to act upon the learners' responses (Rana, 2010). Galanouli, Murphy and Gardner (2004) emphasised the need for trainers to develop strong design and well-targeted delivery of training programme in the new environment of digital technology. In my study, Anuj also perceived that the effectiveness of ICT-integrated teacher training highly depends on the trainers' expertise, how they deliver the training programmes and engage the trainees in learning activities throughout the sessions. Common phrases used by the participants in the interviews, such as *Do this, do that, just gossip and useless chat* indicate they did not consider delivery or design as effective.

The participants criticised the trainers of generic training programmes for various reasons, such as doing too much lecturing, using quickly trained in-service teachers as trainers, using trainers who had no subject knowledge, using trainers who were unable to create a collaborative relationship with the trainees, and killing time. However, most of the participants valued the trainers from the NGO for a number of reasons, including that they were technology specialists, professional, practical, engaging, they fostered collaborative activities, set up practical work in the training sessions, and did less talking.

However, Binod had a different perception of the ICT trainers. He explained that, although he was curious to learn new technology, the trainers could not satisfy him. He added that the trainers were unable to provide detailed information about using the applications in teaching and learning activities. He explained:

> I was quite curious to learn everything in the training. I asked some teaching-related questions. They replied, 'We can help you where you have technological problem or skills are but we may not know everything about how to use the digital contents.' There is a scratch application on the device. There we can develop programmes like videos. When we tried to do that the device was not smoothly working. There was device hanging problem. They didn't say anything about that. There is chat function between the devices. We couldn't learn that well. They should have knowledge of different functions. Sometimes they couldn't find technical solutions of functions.

The detail in Binod's reproach suggests he already had a considerable level of ICT knowledge and high expectations of how he might utilise various functions. His

criticism highlights teachers' perceptions of trainers were correlated with the skills and knowledge they brought to the training and the skills and knowledge they gained from the training.

Summary

The *National Education System* 1971, *Educational Rules* 2002 and later education policies in Nepal have emphasised teacher professional development as one of the core aspects of educational improvement. The *National Curriculum Framework for School Education* 2005 required teachers to become ICT-skilled and to integrate digital technologies into school teaching and learning activities. To produce ICT-skilled teachers, in-service teacher training programmes have been provided by NGOs which provided ICT infrastructure for the schools. However, government teacher training programmes do not cover ICT training. Although university teacher education courses do not yet cover ICT in pedagogy, private training centres in the towns have been the source of training to use ICT in instructional activities.

The participants in this study received two different kinds of training courses: generic in-service training provided by government and ICT-integrated training provided by an NGO. The participants in this study were trained to use ICT by one of the NGOs which supported their schools with ICT infrastructure.

The participants in this study had done several training courses at the Resource Centre and regional level training during their service. The majority of the participants considered that generic training programmes in the Resource Centre provided them with pedagogical knowledge and skills. However, many of them criticised the training courses for not focusing on teachers' needs, interest and context. Rather, they reported, the cluster-based training programmes followed a top-down inspectorial pre-structured pattern. They also criticised the cluster-based training for not applying the training to their real classroom teaching. An overarching criticism was that the government courses did not include training in how to integrate ICT into classroom teaching despite this being a government mandate. Some suggested that the Resource Centre in-service model should be transformed to school-based training to be grounded in practice, acknowledge the needs of the teachers, and so improve education.

Teachers in three of the schools in my study had received a week-long training from the NGO that provided their laptops and programmes, as well as annual refresher courses and phone advice on need. While opinions differed in some respects, they were by and largely pleased with the content of the training and with the expertise of the trainers. Other schools had received only a three-hour induction to their equipment and programmes and they reported that it was too brief to be effective.

The participants who received fuller ICT training appreciated the opportunity to engage in skill development activities, to participate in group work, to do practical activities, and to engage in preparation and presentation of practical class plans. The participants expressed their appreciation that individual digital devices with curriculum orientated digital contents provided opportunities for their learners to engage in learning from various sources that combined technology skills and content knowledge. Most participants' perceptions of their experience in ICT training indicated that they had a positive attitude towards the technology sessions. However, their comments also showed that their attitude to the training depended on their own comfort with the technology and on the level of technology available in their schools for teachers and learners.

Thus, training of teachers to use ICT is only part, albeit an important part, of creating classrooms where ICT is integrated into learning. What ICT resources are available for use within the schools is another vital part. Chapter VII will discuss the available resources and ICT infrastructures in the schools.

Chapter VII: Resources and Availability of ICT Infrastructure

Introduction

ICT infrastructure and skilled human resources are core components of ICT in education. Availability of ICT in the community environment provides an opportunity to use various forms of ICT for different purposes. Dziuban, Moskal, Bradford, Brophy-Ellison and Groff (2010) argued that, incrementally, technological knowledge and skills are developed and nurtured in the community and the emerging generation becomes one of *digital natives.* Although globalisation of technology has already influenced almost all countries in the world, it takes time for a community, and a country, to reach that stage of technology use where the population feels it is *native*. It is, therefore, an opportunity as well as a pressure for many underdeveloped countries like Nepal to adopt ICT in education.

In my interviews, the majority of participants talked about the ICT infrastructure available in their schools and surroundings. The themes presented in this chapter are developed out of their responses. This chapter presents description of the available ICT resources and their usage that I observed in the schools and an account of participants' comments about the resources. The participants repeatedly talked about *access to ICT* in the interviews, and this is one of the main themes in this chapter. The themes are outlined in Figure 7.1:

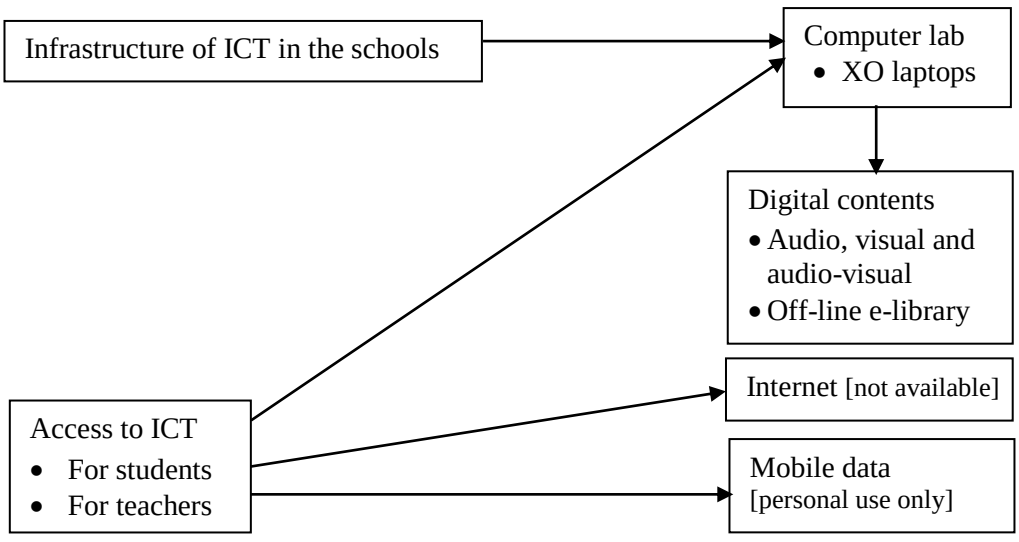

Figure 7.1: Participants' access to ICT and understanding of it

Infrastructure of ICT in the Schools

Among five schools I visited for this study, Annapurna, Buddha and Chadani Schools had their computer labs in use. Annapurna School had both XO laptops and desktop computers, but Buddha and Chadani Schools had only XO laptops in their lab. All of them had a local server and routers to run an e-library in the school's premises. The labs contained sufficient benches for seating students and desks for devices. Colourful charts displayed on the walls provided information on how to handle the digital devices. Annapurna and Chadani Schools had electricity to charge the devices and a backup battery to run the server. However, Buddha School installed a 3.0 KW solar panel, as there was no hydropower extension in the area.

Dhaulagiri School lost its computer lab in the April 2015 earthquake and Ekata School kept the lab unused. Annapurna and Chadani schools, which had been using the digital technology in teaching and learning for over seven years by the time I visited the school, had an old wooden frame to place digital devices for charging but Buddha School, which had adopted the technology more recently, had a more contemporary design of furniture in the laboratory. The desks in the lab had slots on them to place the laptops and every device slot contained a charger.

XO Laptops and Desktop Computers

The schools included in this study were supported with the provision of computer labs by Open Learning Exchange, as has been reported in the previous chapters. The organisation installed computer labs in over two hundred and thirty-two rural primary schools along with ICT infrastructure (OLE, 2017 March 15). The labs were equipped with XO laptops, a server, routers and backup batteries.

In my observation, I found that the XO devices were portable, and they looked durable. The digital devices in Annapurna and Chadani Schools were comparatively older than those in Buddha School. Buddha School had installed the computer lab two year before I visited the school for the study in mid-2016. The device monitors had a touch screen feature which could be rotated 90-degrees. From my observation of the device outlook features, I reflected that the laptops could facilitate the teachers to deliver their lessons and the students would likely feel comfortable learning with them as they could carry the device wherever they went.

In the interviews, the participants described their computer lab and features of digital devices. The following table (Table 7.1) itemises the number of digital devices in each school and the number of those that were functional at the time of my visit.

Table 7.1: Digital Devices in the Sample Schools

School	XO Laptops	Received	Functional	Desktop pc	Functional
Annapurna	40	2009	38	5	5
Buddha	42	2014	42	No	No
Chadani	30	2011	28	1	1
Dhaulagiri	Nil	2011	Nil	6 (destroyed)	No
Ekata	Received 83 After 5 years kept 30, returned 53	2008	Not used	9 (5 out of order)	4

Table 7.1 shows that most of the devices supplied to Annapurna, Buddha and Chadani schools were functional. Dhaulagiri School had received no XO laptops and its PCs did not survive the earthquake.

Participants from Ekata School reported that the school received 83 devices in 2008 on the basis of the *One Laptop Per Child* programme. Every child from Grade Two to Five got an individual device to carry with them wherever they went. However, after using them for five years, the school established a lab of 30 devices and returned 53 devices to the supporting organisation. They seemed reluctant to explain the reasons. Then a new system stopped the children from taking the devices out of the school. The participants also stated that the school kept those portable digital devices in the lab without using them for more than two years. Five of the PCs that had been supplied to the school were out of order at the time of my visit. The comments raised a concern about the potential of those donated devices and the efficiency of teachers, head teacher and management, although they did not provide concrete reasons. However, their perception about digital contents indicates the positive role of the technology in classroom teaching, as the following pages present.

From classroom observations, I found that XO laptops contained course materials for Science, Mathematics, Nepali and English. Teachers and students in the schools connected the devices with a local server installed in the school and could open the e-

library on the devices. The devices had several applications such as wiki, *paathmala*, a discussion board, colouring activities, and some games. In his interview, Bikash from Buddha School commented that the discussion board was a useful tool for teachers and students where they could share their ideas or discuss issues. However, he stated that the teachers never used it in their teaching activities. He explained:

> There is a useful feature: we can chat one to another on this device. Binod and I tried that before. He used to sit with this device somewhere outside, and I used to be here and we could chat with each other. We used to connect it to local network, but we never involved children in that space.

His comment indicates that availability of digital technology does not assure its application in teaching activities. I wondered whether it was unsureness of how to use the discussion board in teaching that prevented them from using it in class, or some other obstacles.

Bhupal from the same school stated that the devices enhanced the printed textbooks in teaching but they could not replace them:

> Most of what the textbook does to meet the objectives of the curriculum, this cannot do that. It is only a teaching material to enhance the textbooks. This is integrated into teaching and learning as a supporting tool. It's not itself curriculum.

Bhupal further described that the devices contained learning materials such as animated videos, colourful pictures, paintings and games. However, the students had access to those devices only in the school lab.

The teachers, particularly those from Chadani School, stated that they had insufficient devices in their computer lab. They criticised the NGO allocation system for not providing them with a device to prepare their daily lessons. In my observation, I found that Annapurna School and Chadani School had insufficient devices to provide every student with an individual device in the lab. Some of the students had to share the same device between them in the class. The teachers always struggled with various issues, like a lack of charge and device hanging.

> Chiran: In fact, *one child one laptop* is required to run the high-level teaching and learning activities. We're demanding a device for individual teachers. If we had one, we would go through digital contents when

> we are at home. We would do better in teaching activities. We are tired after teaching whole day. Next day we directly go to open the laptop and start the class. We have tabled this issue in training too, but they did not say anything about it. They said, 'We'll think about it' but we got no reply later.

Chandra: We have asked OLE to provide us with an individual laptop, but they refused.

The shortage of devices seemed to impact on both teacher preparation and teaching in class. Chiran and Chandra reported that they needed an allocated laptop to work with at home so they could explore the potential of available digital contents. In addition, the practice of sharing devices in class prevented students from experimenting freely with the device.

Chitra, from the same school, reported a similar issue of insufficient devices in his classes, as the number of students increased every year:

> We had a maximum of twenty students last year, but we have over thirty this year which is going to be a problem to manage devices for all.

He also explained that, although the teachers used the devices to search digital content on the device, they never connected them with the internet:

> We use them to search the books. I have not tried to open Google sites or Facebook on those devices. It's a good teaching material.

Chetan explained that the devices were different from other laptops available in the market and they did not have all the features that other common laptops have. However, he commented that the device could be used to access online information:

> It is very different. It does not have all functions that other common laptops have. It's just for students to learn lessons. We can connect to the internet. There is Google. Once I brought it home. I have internet and I connected to the internet. That worked well. But there are other functions it should have that are not there.

Most participants commented positively about the digital devices and expressed their desire to promote the level of technology to improve school education. For example, Elisha from Ekata School suggested that the devices with all the subject contents could perhaps replace hard copy textbooks if there were enough devices for each

student in the school:

> If they have the individual device and all the subject contents, even without the textbook this can work. They used to talk a lot about digital contents and materials in the classroom and outside when they had individual devices with them. Now they cannot do that.

Elisha shared her experience of teaching with and without one laptop per child in her school. She explained how the children two years ago used to learn with their individual devices before they established a lab of 30 devices and returned the rest to the supporting organisation because of difficulties in managing them. Her positive experience of teaching with one laptop per child indicated that sufficient access to the technology provided learners with flexible time to access digital contents in their own way and to build up their own learning path according to their personal interests, desires and needs. However, my observation of Ekata School's lab and interviews with the participants from the school discovered that the school had kept those digital devices unused more than two years. Elisha said:

> We could not use it last year. It took a long time to retrofit this building and we did not have a room to use as a lab. We are thinking to use it again.

On the one hand, there were complaints that there were not enough devices for each child to access one. On the other hand, it seemed that the lab was not closed but the devices were not used at all. The ambiguities in the reports from Ekata School about the availability of devices resonate with the finding of Paola et al.'s (2011) study in the context of Peru, that only providing ICT and necessary resources to the schools cannot assure its implementation.

The participants I interviewed in Annapurna School expressed various experiences of using the digital devices in their instructional activities. For example, Anuj stated that an XO laptop was not a device for learning computer skills as it was designed more for use as a teaching and learning material.

> In fact, *e-paati* is not for learning the computer. It is a teaching tool. If we take this as computer learning, we may be wrong. We let students use it and learn by themselves, and we use it as an educational tool for teaching curriculum subjects.

His expression reflects that teachers can use a range of ICT tools to present and demonstrate various learning materials for the children which have a potential to blend in pedagogy.

Up-dating of Devices

Ananda, from Annapurna School, emphasised that it was necessary to upgrade the level of technology they had in the school in accordance with the progress of time as the devices they had did not have enough of the features that other common laptops had.

> We have to move with the time. Some years ago this kind of device was good enough, but now the world is moving fast. So, we have to go according to the changing environment. It'd be better if we could get more desktop computers in a separate lab. We will connect to internet one day. This laptop does not have everything that a normal computer has.

While participants valued that the devices served as electronic substitutes for textbooks and curriculum resources they judged that they were not of a standard to teach students how to use the technologies that characterise the global world. I reflected in my field notes that while the participants might have felt deprived of features that were available in modern technology, access to a full array of contemporary features might have created new problems. Some researchers (Adams, 2011; Albirini, 2007; Loveless, 2003b; Tezci, 2011) have argued that the digital technology keeps on changing in such a rapid way that it generates a continuous challenge for teachers to create a sustainable environment to use ICT confidently and efficiently in their instructional activities.

In the interviews, the majority of participants expressed their appreciation that the digital devices were useful teaching tools, gave access to a range of teaching materials, and that they could enhance the printed textbook in ways that allowed the teachers to meet the goals of curriculum. They also commented that the use of digital devices in teaching and learning controlled dropouts and increased the number of students in the schools. For example:

> Ananda: Children have a feeling that they are learning from computers. They are highly motivated, interested to use these devices. This has attracted students and increased students in the school.

> Bhupal: Many had left the school before we brought this *e-paati*, but this has now increased many students.

The children's attraction to the use of digital devices in the school reflected Underwood's (2009) finding in the context of English schools that the use of driving games on the digital devices in teaching and learning controlled the drop-out rate of the students every year and increased the number of students in the schools. From my observation of the children in school, I noted that the children with an individual device really enjoyed the freedom of using the device in the way they liked and so would use it eagerly for learning. When observing the children's independent activities, I reflected in my notes, as Lemke (2010) has found, that opportunities, freedom and feasible environment for the learners to use digital technologies appeared to increase their learning.

However, not all the participants reported success in teaching with the devices. For example, Bikash talked about using the discussion board with a colleague but not with students. His restricted use resonated with the findings of Maldonado et al. (2011) in Peru, that simply making modern digital technologies available in the school does not assure the use of those technologies in instructional activities. Similarly, Komis and Jimoyiannis (2007) also found that availability of advanced technologies does not assure the elevation of teachers' pedagogical activities. In addition, in the schools I studied the digital technology was available only in the school for the teachers and students and not for home use. Gümüş (2013) argued that ICT should be made available at home to encourage the learners to explore learning contents themselves and to foster their learning. However, conditions that would make home use possible did not seem to be available in the rural schools I studied.

Some of the teachers in my study were already struggling with utilising the technology they had available for teaching. Much more training and technical support would be required if they had a greater range of technological capabilities available. González-Lloret (2014) emphasised the need to provide sufficient support to teachers so they would understand how to utilise the potential resources within available technology in their teaching.

Internet

Thapa and Saebo (2011) reported that insufficient technology infrastructure, lack of internet, electricity and supporting infrastructure are major challenges in rural schools in Nepal. All schools I visited in my study had no internet facility. In the conversations with the participants of Ekata School, the participants stated that they had used internet before but it was not there when I visited. The interviews with the participants and my observation identified several reasons of not having internet in the schools such as economic condition of the community, schools' financial problems and lack of commitment from school administration.

Annapurna School, which is located in a village in the middle of a national park away from the nearest small town, lacked wire internet service although the village had electricity and a cellular mobile phone service. Buddha School, which is situated in a mountainous village may not get wired internet access for another decade. The district, where the school is, had an asymmetric digital subscriber line (ADSL) and Wi-Fi access only in the headquarters. However, the people in the village had 2G mobile data access, but it was not reliable.

The villages, where Chadani and Ekata schools are located, had internet facility but the schools were not connected to the internet. In interviews, a majority of participants from these schools stated that little knowledge of ICT in the community, underprivileged people and the school's financial problems were the major factors that led to failure to get internet facility in their school. The participants from Dhaulagiri School raised similar problems too.

International literature has emphasised the importance of ensuring students' access to the internet. Somekh (2007) discussed the necessity for radical change in schools that would allow students unrestricted access to internet. Kennewell and Morgan (2006) suggested that the provision of sufficient opportunities for learners to play on computers and the play with the internet that can direct them to explore new features of technology. Leidner (2010) affirmed the internet as a basis for a global village where people are interconnected, ideas are shared, and cultures are eventually adapted. Several researchers (Lemke, 2010; Sharpe et al., 2010; Siemens, 2014) claimed that ample internet provided an enabling environment for the learners because it allowed learners and teachers to update with the recent information, and

provided them with opportunities of choosing materials and information in accordance with their interests and needs. Moursund (2005) suggested that teachers should design classrooms with internet facility where the children can communicate with their friends, parents and others.

However, my interviews with the participants in this study and observation of their classroom found that the teachers were forced to use digital devices in teaching activities without the internet. The conditions they worked in seemed to be outside the frame of international expectations and to address very different problems and needs than those discussed in most theorisations of the use of technology in education. In rural Nepal, ICT in education thus has very different connotations from those in the western world.

One result of the difference is that the participants in my study, probably like other teachers in rural Nepal, have little experience of either the benefits or risks of open information online. For instance, Bate et al. (2012) found that children in Western Australian schools for boys engaged in games and watched vulnerable videos online in the classrooms. Loveless (2003a) found that teachers and students became frustrated when they felt constrained by limited or low-level pedagogical practices after the constant access to computer and internet. From what I observed, I believe that the teachers in my study would not experience the problem described by Dziuban et al. (2010) who found that students who were learning online lamented the loss of face-to-face contact with their teachers. In our conversations, the participants in this study indicated that they were not aware of such kinds of problems.

Most of the participants wanted to be able to use internet facilities in their computer lab. For instance:

> Anuj: If we have internet in our school, we will have access to everyday information, teaching materials, and helpful global information for our students.
>
> Deepa: We talked to head teacher, but he showed us the problem of the bill.
>
> Elisha: There's no internet. But internet is essential today for children.

However, the majority of the teachers stated that they had little knowledge and experience of using the internet. They pointed out that the school administration and

the School Management Committee together make decisions on financial issues, installation of ICT infrastructure and further maintenance of technology in the school. When Ekendra from Ekata School talked to me about the loss of internet from his school, he showed a degree of hesitation and was very vague about the reasons:

> There was the internet before, but it is not now. Broad-link service used to provide the internet here. It used to connect the e-library. I don't know why it was disconnected.

I was not sure whether Ekendra was unable or unwilling to explain why internet facilities had been lost from the school but I wondered about the extent of support in his school from the school administration and School Management Committee for sustaining technology in teaching. The findings of various resserchers, such as Drent and Meelissen (2008), Goktas et al. (2009), González-Lloret (2014) and Yuen, Law and Wong (2003), emphasise the importance of support from school adminstration to develop internet access so that teachers can develop their own knowledge as well as use it in their teaching. Salehi and Salehi (2012) in an Iranian context and Tezci (2011) in aTurkish context also raised the issue that the teachers' limited access to the internet impacted on their use of ICT in instructional activities.

Mobile Data

Mobile data can be an alternative to internet access in the remote villages in Nepal, but it is too expensive for the common people. Some of the participants in the interviews stated that they used mobile data to browse information on Google and to open Facebook. The fact that a majority of them connected with me on Facebook is evidence that they could use mobile data to open websites. The recent record of internet subscribers shows that 58.72% of the total population in Nepal has access to wired or wireless internet access (News24Nepal, 2017 September 1; retrieved 2017 September 11). However, the schools in the rural villages are unlikely to access such an expensive facility when they are struggling to manage funding for private teachers and miscellaneous daily expenses. Ruthven et al. (2005) found that even in a British context the available technologies that stayed abreast of developments were costly to adopt. Moursund (2005) pointed out the challenge that is created because adoption of new technologies into teaching brings an additional investment and costs to a school's

infrastructure. The World Bank (2015) also reported that developing countries might be unable to invest extensively in ICT in education.

In the interviews, some of the participants stated that they used mobile data to browse for online information. For example, Anuj explained:

> Sometimes I open Facebook and search information from the Ministry of Education, Teacher Commission vacancies. My mobile is very small, so it's hard to view. I have not bought a bigger one. The screen makes a difference. It would be easier if I had a bigger screen to open things like *Sajilo English bolne* (easy English speaking app). I see some friends post questions related to the Teacher Commission.

The majority of participants who are connected to my Facebook expressed the similar views.

From my observation, I found that Annapurna School in the Terai and Chadani School near the capital city Kathmandu could be connected to wireless internet if they could afford to pay for the service. Buddha School in the mountains did not have access to wired or wireless internet although there were Nepal Telecom and NCell towers on the top of the high hills for the cellular mobile networks. However, Binod from Buddha School assumed that there might be a possibility of connecting to wireless internet in the school:

> That is up to the school. There may be a possibility in this area because there is 3G data service.

In fact, he did not know that necessary internet infrastructure was not installed around the region except in the headquarters. From my investigation, I found that the complex topography of the region and economic factors were the major challenges that would have to be overcome in order to develop the infrastructure for an internet facility in the area of Buddha School. When travelling across villages through hills and mountains similar to the environment of Buddha School and from my own background life of village, I recalled Loveless (2003b) who identified that economic, social and cultural contexts influence the policy and the provision of ICT resources for teaching and learning.

Digital Contents for Teaching and Learning

The participants I interviewed in this study talked about their use of digital content as well as of hard copy textbooks. They commented on digital content like audio, visual and audio-visual materials. The digital devices contained Science, Maths, Nepali and English e-books of Grades 2 to 5 based on curriculum, and an e-library. The participants reported that there was a range of digital materials and over 7000 digital books related to different fields such as stories, poetry, health, environment, culture, technology, geography and agriculture.

Audio, Visual and Audio-visual Contents

The participants talked about various audio and visual contents related to course books and about additional materials. They described that digital contents featured animated voices and visual effects. In my observation of their classes, I found that the children used the voice feature of the device when reading the texts on the screens of their devices and when doing exercises. The children watched various shapes and moving digits on the devices in Maths class, and various colourful pictures in Science, English and Nepali classes. I observed that most of the lessons contained videos. The majority of participants commented that the audio-visual contents made their presentations of lessons effective and engaged the children in various learning activities on the devices. Although most of the classes were noisy due to the loud audio feature students used, the students did not seem to be disturbed by the noise when they did activities on their individual devices.

Anuj from Annapurna School commented that, although there are similarities between the digital source and printed textbook, teachers needed to integrate both the sources in their plan and instructional activities:

> Digital contents and the printed textbooks are related with each other. We have to integrate them in our lesson plans. The devices contain visual contents but all things are not visualised. These audio-visual contents are very supportive in teaching and learning. Children can learn themselves by doing a lot of exercises. They get self-evaluation feedback and freedom of learning. You have seen in my class how they learn. Teachers just support them when they need it. But teachers have to carefully watch them because there are several games, audio, and visual materials. There are differences in textbooks and digital contents. While teaching multiply, divide, addition and

> subtraction in a normal classroom, I have to draw figures and demonstrate activities which is difficult for me, but there are automated visual demos on the device. Examples are visualised that support learners to learn things easily. Pictures and shapes like square, triangle are displayed on the device.

He commented that audio and visual contents provided the learners with opportunities of learning in their own ways and getting feedback. He expressed his appreciation that such visual contents made his teaching more conformable in the lab than his teaching in normal classroom without those devices. However, he perceived that some of the video games would distract the children and the children would not concentrate in their lessons in the class.

In my observation of the participants' classes, I found that the majority of teachers first presented their lessons traditionally and then involved the learners in various learning activities on their individual devices. I also found that the children preferred to discuss their problems with their classmates around them and would only ask their teachers when they were unable to solve their problems between themselves. The teachers walked around the class, watched the children's activities and supported them in their learning.

Several participants commented that the use of audio-visual materials provided the learners with opportunities of learning in their ways and supported the teachers to create student-centred activities in their classes:

> Anuj: Songs with visual images and other contents with visual are very supportive. Here in the classroom, I have to shout and show them by writing and rubbing out digits, but that device displays every digit in interesting ways that the children love. Even if children forget what they do here, they memorise wobbling digits displayed on the screen. That visual effect has a positive impact. The next thing is that there is a voice feature that speaks or reads contents and children like it. They become happy and feel they have to learn. It is a kind of motivation for them.
>
> Asha: It is helpful to find the meaning of a word. For example, types of rocks are described in the textbook, but this device displays original videos. Students can listen and watch the videos.
>
> Bijen: This device has all of the content visualised. The children easily conceptualise what they see. There are colourful pictures they move

around. The voice speaks, *Do this*, *Do that*, instructs what to do and then says either *correct* or *incorrect*. The children learn by seeing, listening and doing.

Bikash: In Maths, it is equally important to teach all the content, especially to teach Geometry. There are different shapes, angles separately given there. We do not have to speak much about them. There are visual and audio materials. When we want to know if something is right or wrong, this device speaks.

Chetan: There are two different stores on that device: e-library and e-paath. E-library contains thousands of books and videos. E-paath contains course books. There are different kinds of voices, pictures and videos. The automated voice speaks, reads and tells about objects. There are word and picture matching activities. These features attract the children and make them happy. After watching videos, teachers can ask them, 'Write the story of the video that you have seen. Describe the video. What did you see? What's the story telling? What did you see? Write now.'

Deepa: I use pictures along with sounds. I get the children to explore things out of visual activities and reading texts. They are now accustomed to doing it themselves.

Ekendra: There is a lesson on measurement. There is an activity of building a bridge over the river. Some people bring a log to build a bridge with the just approximate imagination of length, but that turns out to be short. They cannot build that bridge. There is another example, one lady cuts a piece of the garment without measuring the size of the body and makes a costume for another woman. That costume does not fit. There is another example of the same activity that shows the right measurement of things. These examples give a lesson to children about why they have to measure. These activities are presented with audio and visual activities. All the contents are presented with practical activities. The children are curious and enthusiastic. They are always ready to go to the lab.

Elisha: They do a lot of activities there, listen and watch videos or different objects. We just need to give some instructions. There are games, musical instruments and music, various subject materials, memory games.

As I collated these comments, I reflected on the relationship of the participants' experiences with what is reported in the literature. Bjerede et al. (2010) found that the

use of digital technology changed the teacher's traditional authoritative role to a facilitator. My participants had similar experiences in the lab, however classroom teaching remained traditionally authoritative. Meyer, Abrami, Wade and Scherzer (2011) found that students solved their learning difficulties using digital devices and the teachers felt that made their teaching effective. My participants also commented on the way their students could work independently with their devices and correct their own work. In western contexts, Kennewell and Morgan (2006) and Roth (2009) found that learners stayed consistently interacting with each other with digital technology without distraction. My participants reported children's high motivation in various learning activities like watching videos about the environment, maths games, health and hygiene.

My observation of the participants' classes affirmed their comments about the features of digital contents the devices contained. In every lab period, children used to run towards the computer lab, grab their individual devices and search the learning content on their devices. Their high interest to use the digital technology and their involvement in various learning activities on the devices aligned with some researchers, such as Ang and Wang (2006), Lim et al. (2006) and Passey et al. (2004) who found that the children spent their time on learning games and worked independently with digital technology. The participants' responses in this study indicated that technology provided the teachers with opportunities to deliver curriculum information in engaging and more comfortable ways than in the traditional classroom and so echoed the findings of Papert and Harel (1991). However, I wondered if some teachers were happy that the technology lab relieved them from the pressure of active teaching and reflected that the literature, such as Tolani-Brown et al. (2010), also encourages teachers to consider innovative pedagogical approaches with ICT.

Nevertheless, not all the comments about the digital content was positive. Bhupal from Buddha School criticised digital contents in the subject of Nepali:

> There is no Grade Five Nepali. There are some erroneous contents in Grade Four Nepali. I talked to the programme developer, 'Why are you copying and pasting from the newspaper?' Then he replied, 'When children come to Grade Four, they can read the text or story. That is our aim.'

His criticism suggested that he did not think that material from a newspaper was appropriate for teaching students their language and that perhaps there were some colloquial expression that he did not think were suitable. Moreover there were no materials to support Grade Five. Regardless of whether his specific concern in this comment was justified or whether the programme developer was correct, the issue remains that Bhupal did not consider that there the digital content supplied was good enough to support his teaching of Nepali. Perhaps he had misunderstood how to use the content. Freedman (2001 June 12; retrieved 2017 September 2) commented that no matter how much technology has made teachers' teaching activities comfortable, it has brought more complicated challenges for teachers and new tasks that require new understandings.

The participants in this study stated that the digital devices contained a lot of digital contents from which they could choose content for their teaching, and the learners could search for their contents themselves. However, Tan (2015) argued that sometimes providing a range of learning materials can raise problems in teaching and learning if teachers or learners do not know how to navigate through the choices. But the majority of teachers expressed appreciation of the variety of practice-oriented digital contents. Their comments sounded similar to several researchers (Olelewe & Amaka, 2011; Ott & Pozzi, 2011; Wheeler et al., 2008) who affirmed that practice-oriented digital contents strengthened students' personalised as well as collaborative learning activities, although the teachers in this study did not have access to direct online contents and had to rely on offline digital contents. However, I wonder if they perceived the students got several opportunities to work on pre-designed practice-oriented exercises and discuss with their classmates when doing the exercises as their personalised and collaborative learning. Their evaluation of the impact of audio-visual materials on the imaginations of their students also accorded with the findings of Moursund (2005) and Lim, Pellett and Pellett (2009) who stated that the audio-visual contents on digital devices provided the learners with an environment where they could feel part of live activities and that such features motivated the children's self-learning.

Off-line e-library

The participants I interviewed talked about the e-library. They explained that the

teachers, as well as students, could access the e-library by connecting the devices to the local server. They stated that they could download the digital contents, save them on their flash drive and store them on other personal devices. They added that there were over seven thousand e-books, and that the IT person from the supporting organisation visited the schools and updated the digital contents twice a year. Kalinichenko (2003) from the UNESCO survey on the digital library in education found that digital library contents were more manageable than website information. Moreover, he argued that websites can create confusion in understanding something deeply.

While observing the teachers' classrooms and sitting with the children in their library period, I found that the e-library contained various digital books in Nepali and English languages. I also found that the children read poems, stories, dramas, novels and other miscellaneous books about socio-cultural values, geography, environment, sports, science and technology. Beside their course books, children could enjoy playing musical instruments and learning to dance with the support of videos.

The teacher participants in my interviews also stated that the digital library contained material for them as teachers, particularly various materials related to teacher training and education policies. However, most of them acknowledged that they rarely read those materials. For instance, Bhupal from Buddha School explained:

> We have to open the server for accessing the e-library. It takes some time to open. There are over 7000 books. Most of them are English, some Nepali literature, newspaper, novel, stories and many more. We do not have much time to read them. Sometimes we read newspapers and training materials.

For the most part, the teachers used the e-library for their student's needs and entertainment. Binod commented that children chose different reading materials, videos, music or games for enjoyment:

> Sometimes they feel bored. Then we let them use the e-library; there are thousands of books. Some are stories, some entertainment books, joke books, games. There are over 25 applications like music, games, calculator, wiki, and many more. These children are too young for some of them. They open them but don't use all of them. It is all in English. The children spend time on Nepali writings that they understand.

His comments reflected that the digital library was useful for him to engage the children in various audio and visual materials and provide them fun with learning materials. However, he also noted that materials in English, which predominated, were not often accessed. Bikash remarked that the different digital materials were useful for his classroom teaching:

> I learned how to use e-library and other applications in my teaching. There are a lot of visual materials about natural disasters, environment, health, agriculture, and so on.

The participants in this study talked about how they used e-library in their teaching activities. The majority of participants related that children in the library class enjoyed reading various e-books, and the library class gave them a kind of relief from teaching activities. However, they stated that they hardly used the digital library in their course-related teaching (apart from Bikash). Their statements reflected that they used the digital library as a different resource than the specifically designed course materials available in a different application called *e-paath*. However, I wondered if they were underusing the potential of the e-library. Kalinichenko (2003) argued that digital library offers a ground for developing various course materials. Similarly, Lim et al. (2009) suggested that teachers' use in their teaching activities of videos and other digital materials available in an e-library could generate a lively learning environment.

Although the teachers used digital materials designed particularly for the curriculum in their classroom teaching, I found that they did regard the e-library as a separate and useful source of knowledge.

However, the majority of teachers from Chadani School acknowledged that they hardly got time to use the e-library:

> Chandra: Mostly I read Nepali literature but I have no time to search for books. I'm thinking to bring one laptop home.
>
> Chitra: I'm always busy. I am thinking to upload that whole digital library and other stuff onto my laptop. There are many materials about health and hygiene, agriculture and many more. We open the server and search literary arts in the library. We have not connected any

other devices outside. There are thousands of e-books.

Chetan: There are two different stores on that device: e-library and *e-paath*. E-library contains thousands of books and videos. *E-paath* contains course books. I have not brought other contents from websites.

Their responses indicated that they needed to learn to use those digital materials available on the digital library. They were aware of its potential usefulness but they seemed overwhelmed by the choices and by the time it might take to find their way through them.

The provision of freedom to use the lab in Annapurna and Buddha schools indicated that the teachers in the schools intended to allow the children flexible time to use the digital materials available in e-library and so enrich their knowledge with technological skills. Some researchers (Collins & Halverson, 2009; Sharpe et al., 2010) suggested that allowing children freedom to use digital technology provides them with opportunities to share their ideas and make their choices in learning. However, when listening to the teachers' expression about their limited use of e-library, I recalled Rogers (2002) and Thorburn (2004), who found that teachers did not sufficiently understand the potential of digital library in their classroom teaching. Baro (2010) asserted that the teachers needed to have in-depth knowledge and skills of handling digital technology. This seems to be an area that still needs development in rural schools in Nepal.

In classroom observations, I found that the students had a separate library class at least once a week. The students in Annapurna and Buddha Schools spent their leisure time in the lab as well as their allocated class time. However, the children in Chadani School were allowed to use the lab in their scheduled period only and that the teachers locked the lab after their class in the lab, and did not allow the children to use it whenever they liked and without a teacher present. In my interview with the teachers, they stated that the children would damage the devices if any teacher was not there to watch them in the lab. Annapurna and Buddha schools kept the computer lab open for the children the whole day. Ananda from Annapurna School stated that children preferred to read e-library books rather than course-related materials: "There are many books in e-library," he said, "Students read books in that library than from *e-paath*."

Access to ICT

To provide maximum learning opportunities for teachers and learners, access to the resources is essential. However, there are various social, economic and administrative factors that influence the management of ICT in schools. This section examines the level of teachers' and students' access to ICT. Availability of ICT in school and at home provides options to the learners to access extensive information available on websites, update with the latest news and events, and share their ideas with other people. Ott and Pozzi (2011) acknowledged that adequate access to ICT provides teachers and learners flexible time to browse extensive online information in accordance with their interest and need.

Among the five schools I visited for this study, Chadani, Dhaulagiri and Ekata schools could explore different forms of ICT service in their community as they are located in the internet service zone near the capital city. However, Annapurna and Buddha schools, which are located in the remote villages, did not have that level of access. Although Dhaulagiri School lost its computer lab in the April 2015 earthquake, the school area could explore access to wireless internet and to facilities for computer technologies. However, Ekata School had kept the digital devices unused for past two years when I visited the school and had unsubscribed the school from internet facility.

What ICT Students Accessed

The teachers and students in Annapurna, Buddha and Chadani schools used the available digital devices regularly in their teaching. In the interviews, the participants stated that, although there was limited or no access to the internet, the teachers and most of the children were familiar with other digital devices such as smart mobiles and television. The majority of participants talked about how the students learned to use smart technology in their daily life. For example, Ananda explained that, although children had limited access to computer and the internet in and outside the school, they learned to use mobiles in their families and they had television in their house as a source of a wide range of information. He said:

> All the teachers must be able to teach using ICT. Children must have the opportunity to learn something from radio, post, audio-visual, visual, audio, print media, email and website. Children can learn many things from online

> information. That may be the objective mentioned in the curriculum. I think over 80% of the total students in our school have TV. Those who do not, have access to mobiles and other sources, they open Facebook, Twitter and other applications and watch programmes. TV is one of the teaching materials. Children watch Animal Planet, Geography and other channels. I do not think they have a computer at home. They learn that in school. It is not only for us, but other children in the community should be introduced to technology and learn with it.

His comments on the children's engagement with Facebook, Twitter, mobile and television channels reflects that children explore a wide range of information relevant to their lessons and beyond curriculum if there is availability of various sources of information. He also suggested that children need to learn something more from their use of ICT at school. He seemed to imply that the opportunity to learn about computers at school would help them learn to be more than receivers of pre-packaged technology.

Chitra from Chadani School assumed that mobile phones and televisions in children's families provided them with opportunities of learning about environment, society and the world. He explained:

> They use devices very well. There are some who are very eager to move forward, but we ask them to follow the teachers. Rarely do any of them have a computer at home. I do not think any families had them before we had these laptops in the school, but gradually this is bringing a change. They learned about computers from the school. They have mobile phones in their families. That supports them to learn new technology. Most of them have a dish and home channels. Sometimes when I talk about different wild animals, they excitingly speak about that. I think they watch Animal Planet, National Geography and other channels. When I ask them, 'Do you watch animal planet?' They shout, 'Yes, yes.' When I ask them, 'Have you seen an elephant? They reply, 'Yes.' They are familiar with TV channels. They always get new information about the world. Sometimes I ask them, 'Who is the Spokesperson of the Lower House in Nepal? Who is the current President of Nepal?' They give the right answer.

The participants' comments clarified that, although there was limited or no access to the internet in their remote villages, there were other forms of information and communication technology like television and smart phones. The children learned to use available digital technology in their ways outside school time as well as using

computers at school. However, the schools I visited for this study lacked the internet, and the children had little access to web technology outside the school. This meant that they were dependent on information that was placed for them in their television programmes or in their e-libraries. DiMaggio et al. (2001) described how digital technology has created a social need to transform lifestyles in order to survive the changes that have come through technology. Knowing how to access and use what they receive through various technologies helps to prepare students for survival in a technology dependent world. However, Somekh (2007) argued that learning to use the internet is vital for teaching students how to select and create information as well as exploring their culture, connecting with friends and accessing learning resources.

When and What ICT Teachers Accessed

The participants in the interviews reported that they used different forms of ICT, such as smart mobiles, mobile data to browse websites, computers and television to get information. Every participant stated that the mobile phone was their means of daily communication and some of the participants reported that they used mobile data to search for online information. Their involvement in social, official and personal activities provided them with opportunities to access the internet and computer technologies. While I stayed with the participants during the fieldwork, joined their social functions and generally spent time with them, I found them engaging on their smart mobile, watching videos, playing games and surfing Facebook. Their desire to have internet, smartphones and laptops in their school reflected their personal interest in using digital technologies, because they had limited access to such technologies.

Among the sixteen participants, ten of them sent a friend request on my Facebook page. That indicated that they had some level of internet access. In the interviews, they stated that they used 3G data to surf websites for their personal activities although they had little or no access to the wired or wireless internet in their area. For example, Anuj said:

> I use data sometimes to open Facebook, sometimes to search for information from the Ministry of Education, and for Teacher Commission vacancies.

However, the teachers commented that mobile data was costly for browsing websites, downloading files and uploading documents. Even in developed countries in the early new millennium, some researchers, such as Moursund (2005) and Ruthven et al.

(2005), have found that state schools would not be able to afford such expensive processes. Rural schools in Nepal would find it prohibitive.

In our interviews, participants agreed that they were familiar with smart devices and the internet, but they acknowledged that they had experienced limited access to web technology and realised that they had a low level of ICT literacy. For example:

> Anuj: So far I've known we need landline telephone to connect the internet.
>
> Anita: No internet. I used to use Facebook on my mobile six months ago but not now.

Asha reported that she could get internet access but found it difficult and costly:

> There is internet in the bazaar. I had a smart mobile, but my baby dropped it on the floor. I received it from my mother-in-law in Kuwait. We used to skype with her, but it was broken in the very first month. It is costly to repair. I used to use Facebook, chat with friends, post photos and comment on them, but very rarely. Head sir frequently writes on the Facebook wall.

Participants from Buddha School reported that they did not have any internet facility:

> Binod: We do not have internet service.
>
> Bhupal: I do not know. I have got a very simple mobile. My children use internet. They have studied computer too. I know nothing about websites. I have not asked about that.

However, Binod, Bijen and Bhupal's friend request on my Facebook page indicated that they used mobile data to browse at least that website. In fact, I found through investigation that the village where Buddha School was did not have wired or wireless internet infrastructure except for the mobile data service.

Teachers from Chadani School stated that, although they had some level of access to digital technology outside the school, they did not utilise it much in their teaching and learning activities. They said:

> Chandra: We do not have internet. There is a desktop computer in the office but I have not used that. I'm busy all the time.
>
> Chiran: There is internet in my house, but I do not use that much. When I find any interesting information, I share it with Grade Four and Five

> but not with more junior levels. We are exhausted after teaching the whole day, and come home.

Chitra: I'm thinking to connect internet for my children in my house.

Chetan: I have internet. We can search information on the websites, but I have not done that. I even do not have good skills and confidence on it. If it had come in our time, we would have good knowledge and skills of the computer. It came later, and we are late.

The teachers' comments reflected that they had very little knowledge of web technology and few skills in manipulating it but they could use some facilities in their personal life and were conscious of their need to use aspects of it in their classroom pedagogy. Some researchers, such as Bhatta (2008) and Drent and Meelissen (2008), have argued that teachers' incompetence in the use of ICT and insufficient pedagogical skills for teaching with it are the obstacles to utilising the available technological facilities. It might perhaps appear that the teachers in this study are illustrative of such obstacles, but as the previous chapters have shown their lack of expertise is part of a much bigger problem that includes policy, provision of resources and training.

Deepa from Dhaulagiri School expressed her experience of learning to use digital technology:

> When we brought the computer to our school, I bought a smart mobile. My brother was far better in technology. I used to gather visual materials through my phone and use them in classroom activities.

Despite her statements about her limitations, she frequently interacted with me on Facebook and discussed her teaching and learning concerns. This indicated that she perhaps had more exposure to digital technology than other teachers, and more importantly, that she was very willing to try out new things and to use them for her teaching.

Elisha from Ekata School also expressed similar experience of using a smart mobile and using data to browse online:

> I do use mobile data at home and in the school when I need to. I teach General Knowledge. I search information on Google by using mobile data. When I do not know something, and I am confused about something, I even

> open data to search information in the classroom. Not that much, but sometimes.

However, the participants' comments overall suggest that they had very little access to web technology. My observation also confirmed that, although the teachers used available digital technology in their teaching activities, they did not have direct connection to internet facilities in their schools. Their use of digital devices was based on programmed digital contents made available on the devices and in the local server. However, the digital contents related to the curriculum and e-library were maintained and updated by the supporting organisation.

The problems of access because of lack of internet facility faced by the schools in my study are common problems in the rural community schools in Nepal. Teachers are confined by factors outside their control. The conditions of the rural context and lack of web technology in the schools in remote villages in Nepal make the integration of ICT into education challenging. As cited earlier in this chapter, Thapa and Saebo (2011) reported that lack of internet, electricity, infrastructure and support are major challenges in rural schools in Nepal. Other developing countries experience similar problems. For example, Albirini (2006) working in the context of Syria, found that the teachers had once a month access to the computer.

Summary

In summary, the schools I visited had computer labs which contained XO laptops, servers and back-up power batteries. The interviews with the participants revealed that the specifically designed laptops contained *e-paath* which held digital content based on the curriculum subjects of Nepali, Science, Maths and English. The local server contained an e-library and several other digital materials. E-library was useful for all the subjects in primary school, although its actual use in the teaching of various subjects semed to be very limited.

In interviews, the teachers stated that television channels had become a source of a wide range of information for the children and they were learning new things. In addition, smart mobiles in the family had become opportunities for the children to learn new technologies and access the web. The majority of participants in this study had smart mobiles in their hands, and they have been connected with me on Facebook

which had provided us with opportunities for sharing personal as well as academic information.

The participants expressed that they felt more comfortable to teach their lessons with audio-visual materials available on the digital devices, and the digital devices motivated the children to learn their lessons. However, technical problems such as charging devices, slow processing of the contents and power cuts had been common issues in Annapurna and Chadani schools. Buddha School did not have those issues as the school had 3.0 KW solar energy to run the lab and had comparatively newer digital devices.

Although the teachers and the students had access to these technologies regularly in the school, the majority of them did not have any access to web technology and other forms of ICT outside the school. The teachers near the capital city had access to the internet facility and digital technology outside the school but they acknowledged that they had little knowledge and skills about internet use and integration of different forms of ICT in their instructional activities. The teachers from Buddha School in the mountains did not have any internet facility in their communities. Dhaulagiri School apparently lost the whole system of digital technology in the April 2015 earthquake and Ekata School had been keeping the digital devices unused in the lab for the past two years when I visited the school in August 2016.

The problems encountered by these teachers are not particular to their schools. They are indicative of problems throughout rural Nepal, and, as the previous two chapters showed, the result of the still wider problems with the implementation of policy, the supply of resources and the training of teachers. Despite the problems and their own acknowledged limitations, this chapter shows that many of the teachers are striving to use the technologies they have available and the students are enjoying their use.

Chapter VIII: Approaches to Teaching and Learning

Introduction

At the core of the introduction of ICT into education is the intention to improve teaching and learning. Such potential improvements are variously conceptualised and theorised according to the individual educational, and sometimes the commercial, values and understandings of policymakers, researchers and educational theorists. For example, Mumtaz (2000) emphasised the importance of recognising and utilising specific learning theories as the basis on which teachers integrate new technologies into their practice. She suggested that a range of theories, from behaviourist to constructionist, might provide such a basis but argued that teachers who use technology richly often tend to align themselves with constructionist approaches to learning. Similarly, Armstrong et al. (2005) emphasised that the use of technologies involves much more than the installation of devices and software: teachers are critical agents in integrating the technology into the purpose of the lesson and in creating quality interactions between the learners, technological aid and content.

In earlier chapters, I have discussed the government of Nepal's vision of how the introduction of technology could transform education and suggested that the vision is economic as well as educational. In particular, there was a focus on increasing access to education through ICT and on making Nepal part of a global digital community. Previous chapters have also reported how participants understood the improvements of teaching that were suggested by their trainers. The key elements reported were the management of the technology, facilitation of independent student learning and utilising multiple sources to teach the curriculum. This chapter reports how the participants in my study conceptualised their teaching and what they actually did in their classrooms.

Teaching methods and techniques are emphasised as core aspects of teachers' professional development although specific teaching strategies continuously change with time and with developments in the social environment. Such changes can create stress for teachers. Innovation in digital technologies and rapid growth in their use have generated new stresses for rural teachers in Nepal. However, teachers cannot ignore the technological environment in the wider world outside school where the

children have already been familiar with some new technologies and need to learn to use others. So, teachers need to learn to integrate ICT into their teaching.

This chapter examines participants' responses about their practices with digital technologies in their classroom teaching, and in their management of classroom resources and student behaviour. My observation of participants' classes focused on their teaching strategies with the available digital technologies, regardless of subject. Although it was not my intention to observe a particular subject class, I happened to particularly observe participants' Nepali, English, Science and Mathematics classes in this study, because the digital contents were particularly developed for those subjects. However, the e-library contained miscellaneous contents which could be integrated with other subjects too. The classroom observation, therefore, was intended to explore how the teachers integrated ICT into their instructional activities across a broad range of subjects.

The participants in my interviews talked about various teaching activities, such as the use of individual devices for the students, peer support, self-learning opportunities, freedom of expression, opportunity for extended practice, motivation, engagement, and learning by doing. In addition to these topics, my observation of their classes provided information about classroom management, particularly management of resources and students in the classroom. The emerging themes are outlined in Figure 8.1:

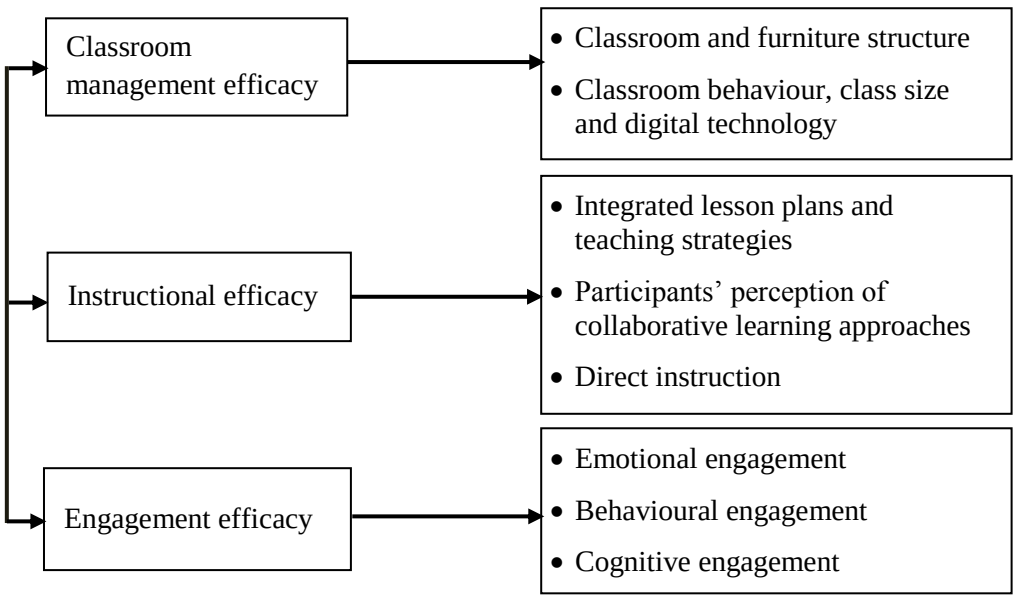

Figure 8.1: Teachers' teaching approaches with digital technology

Classroom Management Efficacy

Internationally, classroom management features as a concern for school administration, teachers as well as the parents. Evertson and Weinstein (2013) found that the teachers, especially beginners, consider the discipline of the students as a fundamental problem and one of the leading causes of job dissatisfaction. They also noted that the public also focuses on the discipline as the central aspect of the school environment. Thus, outsiders often consider classroom behaviour management as a key measure of teachers' efficacy. The participants in this study commented about classroom resources, the number of students and digital devices in the lab, and they also talked about how they conduct their teaching in the lab. My observation of their classes also focused on their ability to organise and use classroom resources and employ various teaching strategies in the computer lab. Skaalvik and Skaalvik (2007) described these kinds of abilities as part of a teacher's self-efficacy. Emmer and Hickman (1991) also considered teacher self-efficacy and addressed it in terms of three dimensions: classroom management efficacy, instructional efficacy and engagement efficacy. In keeping with this categorisation, I am presenting participants' comments and information from my observations in terms of classroom management efficacy, instructional efficacy and engagement efficacy. The following section discusses the participants' classroom management efficacy and the other two elements are discussed later in this chapter.

Classroom and Furniture Structure

Because the shapes and sizes of classrooms and furniture available for learners affect the density of students, opportunities for participation in interactivity and the visibility of students' activities in the classroom (Doyle, 2011, p. 106), I observed how the participating teachers organised these elements in their teaching. The schools I visited had traditional buildings with small sized classrooms into which over 35 children had to squeeze.

In my observation, I found that Annapurna, Buddha and Chadani schools had their labs designed in a similar way, with a similar layout of furniture, sitting arrangements, digital devices, server, backup power and whiteboard. Every school I visited emphasised the computer lab as the practical classroom for teaching and learning and organised the layout differently than ordinary classrooms. The desks were rectangular

and wide enough for placement of the digital devices, and the benches placed at two sides of the desk were able to accommodate four children.

However, the long desks and benches in the lab seemed to cause a significant obstacle, preventing teachers from mobilising students, and none of the teachers in the schools changed the position of the furniture in the lab. Teachers had difficulty in moving students around to organise groups and create interactional activities. I reflected in my observation notes that the design and organisation of furniture influenced the teachers' teaching strategies and that, if it was to allow movement and group work, it needed to be re-organised or replaced with furniture that allowed better access. Another factor that seemed to prevent the teachers from creating group activities in the lab was the size of lab rooms in the schools which were relatively narrow for the number of children who had to squeeze into them. For example, Chadani School's lab had desks in two columns with the benches on both sides where the students could sit and share the same desk. The children sitting face-to-face with their individual devices could look at the whiteboard on the front wall. Similarly, Annapurna and Buddha schools had larger class sizes which consisted of over 40 students in some classes. Therefore, the schools attached the desks to the side walls except at the front where the whiteboard was and placed some desks in a column in the middle of the classroom with benches on both sides to accommodate all the students. The students sitting at the centre column were face-to-face, but the children sitting against the walls faced the walls. Although the children along the left and right side walls could turn their heads to the front, the children facing the rear wall had difficulty in turning around to look at the whiteboard.

My observation of the teachers' 45 minute classes underlined the difficulty and challenge of managing the digital devices and organising the large number of students the teachers faced in a small lab room. Even though Annapurna and Chadani Schools had specifically designed furniture on which to place the laptops for charging, the children would collect individual devices from the charging location and return them back to that place after use, which would take some time and that reduced the teaching time. In most of the lab classes, teachers had to stop the children before task completion due to lack of time. The teachers at Buddha School appeared to feel more comfortable to organise the digital devices as the desks in the lab had individual slots

with chargers, and the chargers could be plugged in all the time. Nevertheless, most of the classes had over 35 students and organisation and delivery of lessons appeared to be a major challenge for the teachers.

Apart from the stresses of arranging the seats for the students in the lab, the allocated period for lab class also prevented for the teachers from organising the classroom resources and involving the children in interactivities. Some of the participants complained that the time allocated for the lab class was insufficient to provide maximum opportunities for the children to practise. For example, Chetan and Binod explained:

> Chetan: One of the problems is that we have 45 minute classes. It is not sufficient to work with technology. We have to leave in the middle of the lesson that we are teaching because there's another class too. This is very short time.
>
> Binod: It takes time for children to open their devices. We have very short time in the class; it takes five minutes to go to the class and five minutes to move to another class. We have about half an hour for teaching in the lab.

Their complaints affirmed what I found in my observation: that the time for distributing the devices to the children and returning them to charging location after use, particularly in Annapurna and Chadani schools, reduced allocated teaching time and the teachers found it difficult to accomplish their planned lessons.

Annapurna and Buddha schools had comparatively larger sized rooms than the other participant schools. They had desks attached on the side and back walls. It was difficult for the students facing towards the walls to focus on the teacher while sitting with their digital devices. I noticed that teachers had to spend more time drawing the children's attention towards the whiteboard in the front. It was almost impossible for the teachers to divide children into groups and create round-table discussions because of the long benches and desks. For example, if a student had to leave the seat, many others sitting in the row had to come out of the seats to let him or her get out. I suggest the non-flexible design of furniture and classroom structure was a problem in the labs.

Another problem I observed was that a large number of students in most of the classes seemed to make it very difficult for the teachers to create collaborative learning activities in the lab. It would, however, have still been possible for teachers to create group learning activities in the lab but I observed that they never tried to involve students in collaborative activities. Instead, the teachers would habitually walk into the lab, wait for the children to get their digital devices ready and start to deliver their lessons. Their regular unchanged classroom, fixed furniture and distribution of individual devices to the children in daily class indicated that the teachers seemed to either lack the pedagogical knowledge and skills for managing the available lab resources or did not feel any incentive to provide more than initial instruction followed by individual student access to the digital devices. When reflecting on the teachers' activities in the lab in my field notes, I recalled the study by Tschannen-Moran and Hoy (2001) who suggested that teachers need to be provided with knowledge about teaching and learning strategies to appropriately utilise classroom resources and create collaborative and self-learning environment. Even though the rural context in Nepal is different, I found Salleh and Laxman's (2014) findings in Brunei high schools useful: that the classrooms should be spacious and for mobilising the learners in the class and involving them in various learning activities whereby the students can use ICT to its fuller potential.

However, the participants I interviewed stated that they were able to manage the large size classes with the individual digital devices provided to the children in the lab. They commented the digital devices supported them to deliver their lessons more comfortably and involve the students in practice.

In this study the labs afforded students access to digital devices, however they were not organised in ways that would facilitate active and interactional group learning. The furniture appeared to lock students into position, however, teachers were satisfied with the operation of the lab, as it allowed them to manage the behaviour of students and to ensure they were actively occupied in working with their device. In my reflections, I questioned whether the teachers were really concerned with learning or whether they were equating focus on computer activities with learning, either about the subject contents or the use of technology. I later discussed these issues and have reported my discussion and further observations in following sections of this chapter.

Classroom Behaviour, Class Size and Digital Technology

Study participants talked about issues such as how to control children's noise in the classroom, deliver lessons effectively, involve children in practice and evaluate their activities in their regular classes. They expressed their appreciation that digital devices had been a means for them to manage their large sized classes. They commented that the individual digital devices for the children in the lab made their teaching more productive than the textbooks in the regular classes. However, I reflected in my observation journal that the teachers were mostly concerned with their strategies of how to engage the children with digital devices and provide maximum practice for their exercises. I noted that the teachers provided the children with individual devices, involved them in various activities on their devices but rarely looked at or commented on work the children did on paper. It seemed to me that part of their preference for digital devices and the resulting limited use of pen and paper indicated that the use of digital technology reduced the need for teachers to look at and correct children's work and freed them to plan their further lessons. I did question, however, whether they were evaluating what their students were learning and whether the students could utilise their learning away from the digital devices.

Through observations, I noted that the participants encountered a number of challenges in organising over thirty students in the narrow lab rooms. Because of the traditional design of the furniture always placed in the same position and insufficient seats for the children, they had to walk around the class to change the seats of the children at the beginning of every class in the lab. Although it was part of the job, I observed that arranging the children at the start of each class seemed to be random, time-consuming and dominant over teaching activities. Similarly, they had pressure to watch every student working on their individual devices as they usually assigned the children various exercises to do on their devices and at the same time the children would engage themselves in other activities than assigned tasks.

The majority of participants' comments also reflected their stress about managing a large class and dealing with individual voices in the lab. Perhaps the individual devices in the lab solved their problem at some level. The teachers, therefore, commented that the individual digital devices had been advantageous for them to handle the large classes. They reported that the use of digital devices in teaching

provided the learners with opportunities of learning themselves and shifted the role of teachers. For instance:

> Anuj: We teach a lesson in regular class, and then we take our students to the lab for the practice of the lesson. We have to shout in the normal classroom. There is no time to check their homework and classwork. But in the lab, students can learn themselves when they get individual devices. Teachers just facilitate them when they need. There are several exercises on these devices, and they provide a lot of practice. Students are so happy using this device as a learning tool, and they do not want to miss their regular lab class. Even if the teacher does not want to take them there, they want to go and press the teacher to take them.

> Bhupal: In the lab, the teacher is just a facilitator. We support them where they have a problem, help them with what they cannot do and where they are confused; and check – is he doing it or not? They learn themselves. They do a lot of work themselves. It is not the same in regular class. Teachers give homework, but they have no time to correct it individually. Then they do mass corrections in the class. Now if the teacher asks the children, 'Have you done your homework?' they reply, 'Yes' even if they have not. They know the teacher is just asking but not going to check it. That is not possible on the devices because they record *correct* or *incorrect*, and how many times a student has repeated the exercise. So, they really have to do their work here in the lab.

Bhupal's comment indicates that the provision of individual devices to the children in the lab engaged each student in their learning activities and minimised the teachers' stress of needing to carry out student evaluation. My observations confirmed this to some extent. However, I observed that the majority of teachers could not reach those students sitting at the corners of the lab or along rows which held a number of students, and they were unable to observe consistently what the students were doing on their devices. Although I found most of the students were engaged in their given tasks, I would always see that some of them were watching videos, playing games or music and ignoring the given lesson tasks. I reflected in my journal that teachers had difficulty organising a large-sized class in a narrow lab room where traditionally designed long desks and benches always remained in the same position. Earlier I had questioned whether teachers were really involved in evaluating learning in the labs or whether they were simply pleased that the labs relieved them of some of their class

management responsibilities. The teachers' comments indicated that they faced the problems of space and a large number of students in a class which impacted the effective use of digital technology in instructional activities. My observation confirmed this, but I also wondered whether it was only the class size that was an issue, and whether teachers were sufficiently aware of what learning they wanted to achieve through the use of digital technology.

Instructional Efficacy: Teaching with Digital Technology

As discussed above, the participants experienced a difference between teaching with textbooks in the regular classroom and with digital devices in the lab. Their comments indicated that the use of digital technology in teaching changed their way of teaching to some extent. They talked about how they prepared their teaching plans, delivered the lessons using digital technology and what they experienced using the technology in teaching activities. They commented that their students preferred to learn with digital devices which contained audio and visual materials and that they, as teachers, liked to teach using those devices more than the printed textbooks. They emphasised that the integration of new technology in teaching and learning motivated and engaged children in listening to audio and watching videos, and to work on lessons. They commented that the technology provided the children with a lot of fun in learning, and the integration of digital technology has shifted to student-centred strategies. They perceived that the technology in the lab provided the teachers with opportunities of creating collaborative learning for the children and self-learning. However, my observation notes reflected that many of the participants' teaching was dominated by lectures and they rarely engaged the children with pen and paper in the lab. The following pages discuss these observations and the perceptions of the participants.

Integrated Lesson Plans and Teaching Strategies

Comments by the participants indicated that they considered they had to continue using the printed textbook for some reasons: mainly the children did not have access to the devices outside the school, and the printed textbook was the only learning material for them outside the lab. In that context, the teachers needed to prepare their lessons and deliver their plans using both digital devices and printed textbooks. The participants I interviewed reported that they prepared their teaching plans collating

both printed textbooks and digital contents. They stated that both sources were correlated with each other. For instance, Anuj from Annapurna School said:

> Contents are related to each other based on the curriculum. That is where we have to prepare integrated lesson plans.

Nevertheless, most participants stated that they used the printed textbooks in their regular classes and digital devices in the lab.

Digital Devices Enhancing Learning

The majority of participants in this study commented that the printed textbooks were helpful for the children to read texts at home and do homework. They considered the digital devices as supporting teaching tools that helped them involve the children in various learning activities. From my observation of their teaching in the lab, I reflected that the learners had a keen interest of learning from the digital devices as they had audio and visual contents.

Ananda from Annapurna School emphasised that teachers needed to choose the right contents from the wide range of digital contents in accordance with the curriculum. He considered the digital devices as a means of supporting the printed textbooks which they used daily in the normal class and as a practice material for the students:

> The contents in textbook and digital device match, but not in order. We have to search for them randomly on the computer. That's the reason teachers have to prepare well before they go to the classroom. We do our full work in our classroom teaching. The contents on the devices strengthen students' learning when they practice on these devices. It is not separate teaching. Next thing they have a feeling that they are learning from a computer.

I understood that Ananda considered the textbook as the primary basis for his teaching and that he saw the lab as a means of allowing students further individual practice. I reflected that such practice could be very valuable to the students but I questioned whether Ananda was aware of how he might use the technology to extend rather than simply practice students' learning.

Anita from the same school emphasised that the teachers needed to develop and employ skills of preparing integrated lessons. She said that the use of digital devices which contained more teaching materials than the textbook provided children with

freedom of learning, self-learning opportunities and more practice of their lessons on their individual devices:

> Trainers trained us how to teach, matching the textbook and digital contents in the classroom. Suppose I teach Science in class five. Whatever the topics in the textbook are, they are also found in *e-pati* though they are not the same and not in consistent order. Whatever is intended to teach in the textbook is also on this device. Digital contents are more than textbook contents, more practice-oriented. Students can learn when they do themselves, watch demos, listen to automated voice saying like *correct* or *incorrect*. Learners can repeat the exercises that are wrong. What they have to learn, they have here on the device.

The participants from Chadani School expressed similar experiences of using both printed textbook and digital devices in their teaching:

> Chiran: The advantage of these devices is that there are contents relevant to the textbook.
>
> Chetan: What we do is we prepare our plan integrating textbook contents and *e-paath* contents. We make that plan so that the children can learn both contents well.
>
> Chandra: The laptops and books are not the solutions and only tools. Most of the textbook contents are the same in a digital copy, but English and Nepali don't have exact contents. So, we have to correlate digital contents and the textbook. In my case, I normally don't use textbooks. I know the level and amount of contents. If every child has an individual device, they don't need these textbooks.
>
> Chitra: It is based on the textbook. It is the next side of the textbook. If the children have an individual device, they don't need this book. We must provide them a personal device which they can take home and bring with them into the classroom.

Some participants' comments indicated their understanding of the possibility and usefulness of integrating both printed textbook and digital source in planning and teaching because they recognised that while there were some differences in contents they were all designed on the basis of curriculum. However, Chandra and Chitra's comments indicated their hope that the digital device can perhaps replace the printed textbooks if each student could be issued with one, to use in school and at home. When I reflected on their comments, I thought I could see the effects of ICT training

processes that had taught them how to locate curriculum content on the devices that were supplied but not yet to explore what children could most usefully learn from the content.

Like Anita, Bijen from Buddha School, also emphasised that teachers need to have knowledge and skills for using both printed textbooks and digital sources in their instructional activities. He explained:

> We have to understand that they are relevant. We've got a teacher's guide to integrating textbook and digital contents. Even with that guide, it is the teacher's responsibility to understand how to collate two different sources. The children read the textbook contents, and then they also do the activities on the devices. There are audio-visual contents on the device that support their learning in an easier way. There are some videos of animals the children watch and learn about those animals.

His comment indicates that the practice-based learning contents on the digital device, if used skilfully by a teacher, can make the children's learning more productive than the textbook can.

Digital Devices as Extra Work for Teachers

Asha, from Ananda School, complained that the digital devices added more responsibilities to her regular preparation and classroom teaching activities:

> Textbooks have different contents than devices. I teach them separately. It is hard. There is a lesson about *crow* in the textbook, but on this device, there is about *parijat*[13].

Asha's comment made me question the kind of teaching that Asha seemed to prefer. It seemed she wanted to directly reproduce material from the textbook rather than considering the underlying questions and issues that gave rise to each topic. At the same time, I understood that she perhaps had limited knowledge and skills of pedagogy to understand the curriculum and use various materials to teach the content. However, many other participants focused on the requirement for the teachers to have sufficient knowledge and skills of teaching strategies.

Like Asha, Bikash from Buddha School, complained that teaching the same content in

[13] A kind of plant

the lab added extra responsibility to their regular job. He argued that he needed to teach processes in his normal classroom before students could properly deal with them in the lab with digital devices:

> There is the situation I have to teach the same content twice – once in the normal class and another here in the lab. Like the one yesterday: I taught them about rectangles in the lab. I couldn't teach them well there because I had not taught that lesson in the regular class. There are many different activities here on this device. They have to do all those activities. I involved them to really measure different objects in the class before bringing them here. It would be better if I could ask them to do that here.

His argument again seemed to indicate that he recognised to some extent both the printed textbook and the digital devices in the lab were complementary with each other but, that he had not yet worked out how to use both for their best advantage.

I reflected that the teachers' two different routines for teaching, in regular classroom and in the lab, seemed to be confusing for them to follow daily. They taught students of each year group at least once a week in the lab, and most of the classes were conducted in their normal classrooms. They seemed to either use the lab for further individual student practice or as an alternative, and sometimes clashing, teaching resource. However, I observed that the lab in these schools would be occupied by different year group students and their teachers every day.

I found that teachers used both the digital and printed textbook contents in their teaching. However, even those who expressed their understanding that the two sources were interrelated tended to use both separately, reserving the digital contents for their weekly lab sessions that were designed on the basis of the curriculum. It seemed that limited access to the lab was a key factor contributing to the division. Many of the teachers stated a preference for the digital materials since they were more interactive audio-visually, and some suggested they would use them to replace the textbook if digital devices were available for each child to take home as well as use at school.

Cost Effectiveness

I reflected that both the textbook and the digital contents seemed to be relied on as authoritative texts and used to directly prescribe students' learning. The value of the

digital contents seemed to be evaluated mainly in terms of the way it could engage children rather than as a basis from which to allow students to freely seek alternative sources of information. This seemed to be confirmed by the way teachers reported their students' use of the *correct* and *incorrect* functions. I had noted that de Oliveira (2014) claimed the effectiveness of teachers' use of digital books and other materials relies on the institutional culture. It seemed to me that the institutional culture of rural Nepal was still one of top-down teaching, and that teaching styles had not changed in these schools because of technology but rather that the same style had expanded to include the use of more interesting format of presenting content.

UNESCO (2016) reported that after teachers, printed textbooks are the second most valued teacher resource in developing countries where the modern technologies become too costly for schools and parents to afford for their children. The report acknowledged that digital textbooks could be complementary but the costs of providing Wi-Fi so that students could have rich access to current digital material would be prohibitive. In contrast, as discussed in the previous chapter, I reflect that from the point of view of production, transportation and distribution, it becomes too costly to provide, in a timely fashion, millions of sets of textbooks for the students in schools in geographically complex places in Nepal. And, if the cost of several years' considerable amount of investment on printing and supplying textbooks is calculated and compared with single investment on digital devices for several years, the investment on the technology would be economically cost effective and educationally productive.

In further conversations, the participants in this study seemed to think that, if the children got individual devices to take home and bring into the classroom, it would decrease the burden of managing many millions of sets of printed textbooks for children every year and could eliminate the problems caused by chaotic distribution of books to rural schools that repeatedly necessitated teachers managing the first quarter of the academic year without textbooks. From my journal notes about geographically complex places in Nepal and the participants' comments, I reflected that successful use of ICT in education could solve the scarcity of textbooks and provide a cost-effective means of improving education. However, such use would depend on continuing individual access to digital devices, and either regular loading of

appropriate resource materials or access to the internet. Within rural Nepal neither of these is yet cost effective.

In interviews, teachers stated that the text-to-speech feature on the digital devices especially supported the children to learn English pronunciation. From the classroom observations, I reflected that the teachers' effort to utilise limited digital technology resources brought a degree of change in their traditional teaching strategy that had mainly relied on lectures, and that the provision of individual devices to every child in the lab to some extent shifted the teachers' role from lecturer to facilitator. Nevertheless, there was still a clear expectation in the labs that the content and direction of learning would be provided by the programmes on the devices. I found, consistent with Krumsvik's (2005) study in Norway, that the teachers' use of ICT in their pedagogy challenged the hegemony of textbooks. The participants' comments in this study suggested that their practice of digital technology in their teaching decreased their dependency on printed textbooks to some degree. However, the digital resource available in the schools in this study was limited and the teachers and students had limited access to internet and information online. The context in Nepal was clearly very different than the contexts in which most of the research about the impact of the use of ICT had taken place. I reflected in my field journal that it was to be expected that the teaching intentions of the teachers in my study would also be different.

Participants' Perception of Collaborative Learning Approaches

The participants in this study talked about collaborative learning with digital technology. They commented that integration of the technology into their instructional activities created a student-centred learning environment, provided the learners with self-learning opportunities and engaged the children in different exercises which improved their learning habits.

In my observation journal, I reflected that the teachers usually started their classes with direct instructions on how to find the learning content on the devices and they wrote the information on the whiteboard before asking students to do various activities on the devices. Then, they instructed the learners to work on their devices and they just watched the learners doing activities. I reflected that in this context

student-centred seemed to mean being able to leave students to work independently rather than facilitating students to follow their own interests or processes of inquiry.

My reflection in my observation notes was consistent with the perceptions of the majority of participants, as they explained that the children had freedom of learning, and they got immediate feedback on the devices. However, they stated that they had to watch the children carefully while they were doing their activities on the individual devices. Most participants perceived that the use of those digital devices in teaching decreased children's hesitation to talk to their classmates and teachers, and it established friendly relations between them. For instance, Chitra from Chadani School expressed:

> We behave like friends. They might have had the feeling 'Am I weak in the study or less than someone?' That is a kind of hesitation in them. So, their involvement with their classmates is really supporting them to learn.

Elisha from Ekata School, which had stored the devices for the past two years, reflected her previous experiences of using digital technology in her classroom teaching:

> They used to talk about a lot of digital contents and materials in the classroom and outside when they had individual devices with them.

She perceived that children having access to individual devices developed their learning habits, increased discussion among their peers outside their classes and improved their learning. However, she expressed her despair that such interaction among the children declined after the school began to keep some of the devices in a room in the school and returned most of them to the supporting organisation. Her expression reflects that the provision of individual devices for the children to take with them wherever they went developed their interactivity among their peers and that gradually declined when the school withdrew all the devices from them.

From my observations of classes, I found the children appeared highly enthusiastic about using the devices and for the most part they were engaged in the various activities on the devices that contained audio-visual materials and games. Their keen interest in learning with digital devices reminded me the findings of Tüzün, Yılmaz-Soylu, Karakuş, İnal and Kızılkaya (2009) in Turkish primary school: that the use of

computer games in Geography classes increased students' motivation to participate in exploration, interaction and collaboration, and the games provided them with rich opportunities for learning, gradually made them autonomous and improved their achievement. Also in my observation notes, I reflected that the children seemed to prefer to play with those contents that had audio and visual features.

I reflected in my observation notes that the majority of teachers' pedagogy was centred towards students' practice and a kind of drill on individual devices. They tried to engage the children on their individual devices rather than organise group work among the learners. I did not see them actively encourage interactivity in any classes, but rather they allowed the learners to use the devices on their own. From my observation, I reflected that the majority of participants' teaching was oriented to a guided individualised question-and-answer strategy rather than a collaborative approach. For example, I observed that the children would read a story in the Nepali subject class and try to answer multiple choice questions based on the text that followed. They might select a wrong answer at the first attempt and would try another alternative. They continued this process until they got the right answer and they would repeat the exercise several times. It was similar in other subject classes too.

Direct Instruction

As discussed above, the majority of participants perceived that they were able to create student-centred learning environments with the use of digital devices in their teaching in the lab. They commented that the integration of digital technology in their instructional activities decreased their giving of lectures and increased students' self-learning activities in the classroom. For example, Chiran from Chadani School explained his understanding of how students' participation in various collaborative activities was essential to make teaching effective:

> Just the lecture does not make teaching effective. We have to go through problems in the groups of students, ask them individually to participate in interaction or discussion or speak out their problems when they are working on their devices. That makes them active in learning lessons. We have to involve weak students in group work.

His statements suggest that the incorporation of digital devices in teaching created interactivity in the lab. However, the interactivity I observed occurred when students

helped each other find the answers rather than in active discussion of the content. Instead, the teachers' imposed instruction to work on a particular text, problem or exercise indicated that their teaching was dominated by a transmission method. Moreover, Chitra argued that, although the use of digital devices benefited the talented students, weak students seemed to follow the lead of others:

> I think high-level students highly benefit from these devices. The low-level students mostly copy their friends. Even if we instruct them, somewhere, they are lost. But they learn better from their friends.

In my observation of Chiran's classes, I found that he developed a regular habit of asking the students to open their individual device and find the content they were supposed to learn on the day. He would observe the children working on their devices and go to them whenever they asked for help. The majority of participants' teaching strategies were similar to that of Chiran. As I observed, I reflected that a positive aspect of the teaching with digital technology was that the children were working in their own ways on individual devices. The teachers would explain the content they wanted the children to attend to and so would largely dominate children's learning activities with the devices. For example, the teachers, particularly in Nepali, English and Science classes, would hold a device in their hand like a textbook and ask the children to open the content and would instruct them to follow the activities on the devices. It seemed as if they were replacing the printed textbook with the digital device. I noted in my observation journal that the teachers rarely involved the children with pen and paper in their learning activities. I reflected that the process of explanation of texts meant that they were continuing their traditional strategy of direct transmission teaching even though the children were being kept busy in doing various activities on their devices.

I found that the teachers teaching Mathematics would allow the children to work on their devices on their own with the intention that the children would practise the problems several times and solve them. However, I saw that children shared their problems with their classmates beside them and seemed to be working together when they had learning difficulties. Several participants explained to me that their students had the printed textbooks for their regular studies where they would learn new processes concepts, and they were simply practising their lessons on the digital devices. The comments and my observation indicate that the teachers seemed to use

the digital devices as supplementary teaching materials. Perhaps their lack of sufficient teaching knowledge was the primary cause of not being able to utilise the potential of available technology in their teaching. However, their comments indicate that they were aware that the device has a lot of authentic contents useful for the children to explore, and this would allow them to interact and collaborate among themselves.

Engagement Efficacy: Role of Digital Devices in Student Engagement

A key aspect of my classroom observations was student engagement. In the interviews also, the participants talked about classroom management and student engagement with digital devices. Many participants stated that in their regular classes they had to deliver lectures because they found it too difficult to provide sufficient time for individual students, to involve them in various learning activities and to correct their daily homework. They argued that they had to teach a whole day without any free period.

The participants commented that the new technology in the lab changed their way of teaching and engaging the children. They expressed their appreciation that digital devices attracted the children to do various learning activities. They claimed that the children learned how the content fitted in their work with the devices rather than having the teachers impose the lessons on them. They also stated that the technology decreased their work pressure in the classroom, supported them to deliver their lessons more comfortably and provided the children with opportunities for learning by doing. This section discusses their experiences and perceptions of using digital devices to foster student engagement.

In the following pages, I examine teachers' perceptions of their students' engagement through three lenses: emotional engagement, cognitive engagement and behavioural engagement. I noted in my observation diary that some studies, such as Poskitt and Gibbs (2010) and Reading (2008), examined the importance of *emotional engagement*, which involves elements such as individual interest, happiness or values and is realised in student-teacher relationships, expressions and social activities. In this discussion, I use the term to refer particularly to the perceived pleasure students

had in working with technology and their eagerness to do so. Poskitt and Gibbs (2010) stated that *behavioural engagement* of the learners is observed in their classroom participation in various learning activities, individual performance and presence in group tasks. Here, the term refers to the observed patterns of student behaviour in the lab that suggest a commitment to the task and development of practical strategies that can lead to increased learning. Similarly, it was noteworthy to acknowledge the findings of Pietarinen, Soini and Pyhältö (2014) who concluded that the cognitive development of the learners was dependent on their capacity to manage their manifold and parallel learning tasks and contents. While *cognitive engagement* could refer to a wide range of learning process, in this discussion, I use the term to refer to the observable shifts in behaviour that suggest development in thinking processes and attention to understanding concepts or processes.

Emotional Engagement

In the interviews, the participants commented that digital devices excited the children in learning and motivated them to attend class regularly. In my observation, I also observed that children frequently came to the staffroom to remind teachers about their lab classes. In several interviews, the participants stated that children became disappointed when their teacher forgot or changed the lab class. They acknowledged that their lectures in the regular classes generated a degree of monotony, whereas in the lab children were happy and excited and were able to exercise freedom of expression when they were learning with the digital devices.

Student-Teacher Relationship

The participants in my interviews commented that the use of digital technology in teaching and learning reduced fear in children and helped them develop a friendly relationship with the teachers. For example, Anuj from Annapurna School shared his experience that his students would comfortably discuss learning issues with him when working on individual devices:

> Children ask me without hesitation when they don't understand contents. You have seen Class Six and how they were doing.

Ananda, from the same school, expressed his appreciation that the devices in the lab had brought a change in his teaching as well as in students' thinking:

> I used to use chalk and talk, and shout a lot while teaching Maths. Students were afraid of asking questions. Since we got these devices, I do not have to shout, and I just go to every student because they are with their individual devices. They openly share their problems now.

The majority of participants expressed similar experiences. They perceived that the use of digital technology in instructional activities generated a more social environment where the children felt comfortable to share their learning problems and feelings with their teachers and peers. They commented that individual devices in the lab provided them with opportunities for teachers to talk one-to-one with students which created a friendly relationship between student and teacher. For instance, Chitra from Chadani School said:

> It is difficult to reach every child in the normal class but in the lab I can individually help them and they share their personal problems with me.

From my observations in these schools and from my teaching experience in primary schools in Nepal over a decade, I reflected that the student-teacher relationships in the schools in this study was entirely different than those of earlier years. In the past, because the teachers had an authoritative position and students were treated as juniors, students used to be scared of standing with the teachers. From my experience of being a primary school teacher in the late 90s, I reflect that the teachers used to impose lessons on the learners and the students had to memorise everything the teachers gave them. The teaching strategy of asking for memorisation always dominated, and dampened the creativity of the learners. However, students in the schools I visited in this study followed their teachers, talked to them freely and shared their problems without hesitation. For example, when a teacher would be busy with a student in the class and delay giving support to other learners, students would go to the teacher with their devices and openly discussed their problem with the teacher. The proactive behaviour of the children to the teachers in the lab indicated that the technology was gradually shifting the traditional authoritative teaching strategies to a degree of teacher-student interactivity in teaching and learning.

Learning Excitement

In the interviews, most of the participants talked about students' motivation for using digital technology in their learning activities. They expressed their perceptions that the use of digital devices in teaching created delight and so motivated children to

learn their lessons. For instance, Anuj and Ananda from Annapurna School explained:

> Anuj: Students are so happy using this device as a learning tool, and they don't want to miss their regular lab class. Even if the teacher doesn't want to take them there, they want to go. Another thing is that they are highly motivated and interested in using these devices. It has attracted students and increased the numbers in the school.
>
> Ananda: When there is a lab class, students are very excited to go there. Teachers are also actively keen to use the lab.

Their comments indicated their belief that incorporation of digital devices in teaching allowed new ways of learning for the children and created an enthusiasm for learning. The majority of participants expressed similar experiences about using digital devices in their teaching:

> Binod: We have to work very hard, and the class becomes monotonous in the normal classroom. Children feel tired after whole day of class too, but we have to teach anyway. In the lab, we provide them with freedom to use these devices so that they can learn themselves. We don't have to work so hard. We're more confident and comfortable in our teaching.
>
> Bhupal: Overall everything is good. I think audio and visual materials attract the children more. They love to come to the lab all the time. They don't care about time or food when they are in the lab.
>
> Chiran: If it is the lab class, they remind their teachers early in the morning. They are very excited to go to the lab.
>
> Chitra: Very much excited to go to the lab. They even remind us about the lab class if we forget.
>
> Deepa: We first brought in a visual learning kit. The server was brought later. It was quite fun to show things subject-wise. The students used to be very happy. Students were not interested in coming to the lab just to learn to type.

These expressions reflect participants' belief that the interest provided by the digital devices and the audio-visual materials provoked the children to engage with them and therefore with their lessons. They also suggest teachers discovered new ways to be responsive towards the children through the use of digital devices in their teaching. Deepa from Dhaulagiri School expressed her frustration that the teachers and students lost their happiness when the April 2015 earthquake destroyed their lab and the school

could not revive it. She also expressed her experience that the learning kit which contained audio-visual materials interested and attracted the children in the lab rather than learning basic computer skills like typing.

In my observation, I found that the majority of teachers encouraged the children to keep working on their learning problems until they got a solution. For example, when a child completed a task successfully, the teacher and the whole class would clap. That would motivate other children to work on their problems. However, I noted that most teachers were not able to transfer the children's excitement and enthusiasm for learning individually with their device to creating collaborative activities such as group work and discussion in their classes. Instead, the majority developed a routine of distributing individual devices to the children and prompting them to engage individually.

Cognitive Engagement

The theme *cognitive engagement* addresses the students' involvement in various classroom activities that required thinking. It is conceptualised from the learners' motivation, personal learning style and self-directed activities (Pietarinen et al., 2014; Poskitt & Gibbs, 2010; Virtanen, Lerkkanen, Poikkeus & Kuorelahti, 2015). Although classroom observation did not allow me to identify a wide range of cognitive processes, students' activities with the digital devices did reflect a number of specific cognitive shifts. I observed that both teachers and students had experienced a cognitive shift in the way they regarded learning: teachers were being less directive than in their classrooms and students were relying less on their teachers. The ways children opened the digital devices and searched for information themselves suggested they had assumed some degree of agency in seeking knowledge. In my visit to Chadani School at the beginning of the new academic session, I observed the teachers introduced digital devices to Grade Two students for the first time. I found that the children were able to open the devices, find their class, subject and content in the first week. They could shuttle between various digital contents easily within the second week. In the case of Grades Three, Four and Five, the children were independent in operating the devices, searching digital content or accessing e-library without the teacher's help. Teachers' reflections about self-learning opportunities which reflect cognitive shifts are discussed in this section.

Self-learning Opportunities

Many of the participants in the interviews emphasised the occurrence of self-learning. They commented that the digital devices created a student-centred learning environment in the lab that allowed children to direct their own learning. For example, Anuj said:

> Students become active themselves and learn on their own. Teachers just have to support them in case the device hangs or content is missing, and sometimes when they don't understand contents.

In my observation, I found Anuj operated as a facilitator who supported the children if they needed help when working on their individual devices in the lab. For example, when he heard the voice from the device say 'incorrect', he would walk over to the student and help him or her solve the problem. The majority of participants reported similar experiences of being able to create an environment where the children could work on their individual devices independently. For example:

> Ananda: There are exercises that engage the children a lot. Students can find their work correct or incorrect themselves.
>
> Anita: They are very active when they are in the lab whether they know the content or not. Mostly they solve their problems themselves.
>
> Binod: We give them a lot of freedom to use these devices so that they can learn themselves.
>
> Chiran: Children can do exercises on their own. If they have incorrect answers, the voice speaks and they can revise it until they correct. There is no chance of cheating. They can work themselves; the teacher just facilitates.

My observations confirmed the participants' perceptions about the role of the digital technology in creating a self-learning environment. I reflected in my observation journal that the teachers seemed to focus on individual learning as they always provided the learners with an individual device and observed their learning activities individually. I saw that the children tended to discuss their answers and their problems with their peers beside them. They would consult their teachers when they could not solve their problems with the help of their peers. I considered that students were indeed learning through the combination of focusing on individual tasks and asking

their peers for help when they were stuck, and so the teachers seemed justified when they felt they had a successful teaching strategy.

Students Accessing Materials

I observed that children in the lab searched for various videos, pictures, audio and other reading materials on digital devices themselves. In the interviews, Ananda from Annapurna School expressed that a lot of practice-oriented digital contents kept the children highly engaged:

> In the textbook, we find just limited examples, but there are many practice-oriented materials on these devices. The teachers give activities to the students and just support them.

His comment reflects his perception that the children were gradually learning to explore their learning contents themselves. On the other hand, Anuj suggested that the teachers needed to be careful when allowing the children to work on their individual devices independently to prevent them from being distracted:

> Teachers have to carefully watch them because there are several games, audio, and visual materials.

Bhupal from Buddha School shared his experience about how rapidly the children learned technology skills and suggested that the children should be given opportunities to develop their own skills. He reported:

> After the training, we brought these devices here. After some days, we allowed them to use these. They were so fast to search things.

His comment reflects his supposition that the children could transfer their learning of technology skills to other learning activities.

Elisha from Ekata School also expressed her pleasure in the ready way students picked up how to operate their devices and use them to locate information:

> There is a lot of difference from ordinary classes. If we just train them how to operate the devices, they find how to search for information themselves.

From my observation, I reflected that most of the teachers who were participants in this study played the role of facilitator, although a few tended to explain everything to the children before letting them work independently on their digital devices. I

considered their support of their students' use of the devices indicated their desire to engage the students in learning and, to some extent, to help them become independent learners who could solve problems themselves. Kennewell and Morgan (2006), in a Western context, found that digital devices with multi-media features provided the children with opportunities of experiencing failure and overcoming it. I reflected that the children in the classes I observed were experiencing frequent small failures whenever they received an *incorrect* response from their device and I could see that they seemed to be regarding this as part of their normal process in achieving correct answers.

A small scale project with young primary school children by Bottino et al. (2007) found that cognitive processes involved in playing certain games on the computer enabled children to increase their technological knowledge and to use their cognitive development in other learning. My observations were too short to allow me to explore whether this was happening in the schools in my study, but the comments of many of the teachers implied that they believed it was.

In my observations, I found that teachers focused on the activities of individual learners rather than developing group activities in the lab. I reflected that this was consistent with a study by Hayes (2007) who found that as soon as the children got individual devices in the classroom, they moved to individual learning and the teachers changed their teaching strategies accordingly. In an earlier chapter I stated that several teachers had reported they had learned to use group work in their ICT training sessions. As I reflected on the practice I observed it seemed that whatever their intentions had been when they finished their training, the absorption of students in the use of their individual devise satisfied them and they too adapted their teaching plans accordingly.

Behavioural Engagement

I use the term *behavioural engagement* to refer to what I observed the students doing with digital devices in their lab classes that suggested sustained commitment to the task and to what the teachers reported they perceived. In the interviews, most of the participants stated that they were able to generate collaborative activities with the integration of digital devices in their pedagogies. For example, Chiran explained:

> Just giving a lecture does not make good teaching. In the lab we go through problems with groups of students, ask them individually to participate in interaction or discussion or tell us their problems. That makes them active in learning activities. We involve weak students in group works. They learn from others. Even if he cannot solve problems, he learns from others when they are active. At least he develops speaking skill.

Chiran's comment indicates his belief that the children became more enthusiastic to learn with the digital devices, and that low-performing learners' participation in learning activities in particular was improved. From my own observation, I reflected that the teachers' strategy of engaging the learners on individual devices seemed to be dominating over any participatory learning activities. I did observe the positive element of improved communication that Chiran had referred to, in such as the children's conversations between themselves as they worked on their devices and their discussions about answers.

I noted my surprise in journal that none of the participants complained about the kinds of classroom behaviours which used to occur in the past and which I remembered from my own primary school life from about thirty years ago and from teaching in primary schools about fifteen years ago. Although the children were from poorly educated communities, I did not find that disruptive student behaviour was an issue in any of the participants' classrooms.

Participation and Interactivity

The teachers in this study talked about students' active participation in learning tasks and about the new kinds of interactions that they perceived were developing among students. Wang and Degol (2014) stated that different interactions, such as between student and teacher, student and student, at various moments in the classroom promotes learning achievement. They also stated that students' participation in such interactions when working on various learning tasks in the classroom shows their engagement. From the participants' comments, I understood interactivity as their perception of learners' conversations when using digital devices in the lab and participation as the students' involvement in the learning activities. In particular, participants commented on how children used their devices' *voice* in English classes to learn to pronounce the words correctly. My observation confirmed that the children imitated the automated voice to learn English words, phrases and sentences. I noted

that, although the participants seemed to perceive the text-to-speech feature as interactivity, the devices did not have two-way communication features that would allow real interaction between human and device.

The participants emphasised students' participation in learning activities with their individual devices in the lab. They expressed their appreciation that the incorporation of digital devices in pedagogy prompted the learners learning in groups and on their own. For instance, Anita said:

> We focus on the group activities based on the problems in the textbook, but in this lab, they work on their own.

In my observation of Anita's classes, I found that she gave the children flexible time for working on their devices and supported them whenever they asked for help. However, she was unable to reach every child to observe his or her activities on the devices even though she tried to help most students in the lab. I observed that some children kept themselves busy by zooming the screen of the device in and out and playing with texts, videos and games just for fun.

In contrast, Bhupal from Buddha School reported similar experiences and claimed that the digital devices supported him to develop independent learning habits in the children:

> It is also supporting them to learn independently. Children read themselves too. We give a task of reading to develop reading skills.

My observation noted that rather than involving the learners in group activities, he would ask the children to read texts independently and to do the exercises that followed on their individual devices. He would demonstrate examples at the beginning of each class before asking the children to practise exercises. However, he frequently read other passages aloud to the students and explained the texts to the class instead of asking the children to read the texts. I reflected that his lecture-style of teaching dominated over the students' potential for self-learning and collaborative activities.

Binod, from the same school, stated that he divided the students into various ability groups to improve their English:

> You've seen today's group who are at a really low level. I am grouping the students according to what their level is, and coaching them. I believe this will improve their reading English.

When I observed his classes, I noted that he sometimes taught a group of at-risk students in the lab and supported them in their learning. However, the majority of students were left in their regular classroom without a teacher. When I discussed this with him, he did not provide any rationale for leaving many students without any teacher. He did state that the digital devices supported him in teaching needy groups of students as the devices had an authentic voice with which to practise English pronunciation. I observed that the native English voice had become a guide for the children to practise English texts.

Chiran from Chadani School expressed his experiences of using the technology in teaching:

> We go through problems in the groups of students, ask them individually to participate in interaction or discussion or talk about their problems. That makes them active in learning activities. We have to involve weak students in group work. They learn from others. Even if he cannot solve problems, he learns from others when they are active.

Similarly to other participants, I observed that he would mainly engage the children on their individual devices.

My overall observation found that the teachers did not create collaborative learning activities such as group discussions or presentations. Perhaps this was because they had sufficient digital devices in the lab for each child. The most common teaching strategy in the labs seemed to be the selection of sections of problems that were on the devices. It seemed that the participant teachers' utilisation of the digital technology indicated that they perhaps had little knowledge of collaborative learning and insufficient expertise of using the technology.

Lee (2002), writing within the context of Hong Kong, argued that teachers needed to have both competence in manipulating technology as well as knowledge of how to use collaborative activities if they were to be able to integrate technology in pedagogy successfully. While my observations of practices within the lab suggested that the participant teachers were not achieving success in the terms Lee had described it, they

were developing students' motivation and commitment to working with the digital devices and carrying out the learning tasks that were provided on them. I reflected that this is consistent with the finding of Kennewell and Morgan (2006) who claimed that the use of digital devices in teaching motivated and engaged the children in their learning tasks. I recorded in my observation journal that the human voice on the devices, audio-visual contents and drawing features attracted the children to do learning activities on the devices. Ang and Wang (2006) earlier found in Singapore that multi-media and interactivity features of ICT interested the learners and motivated them to work on their lessons. The participants' reported experiences aligned with the findings of DuFour and DuFour (2010) who stated that digital technology helped the children who needed additional support. Nevertheless, the overall reflection from my observation was that the participants' teaching strategies accelerated decentralised and individual learning activities rather than promoting participatory learning.

One Student–One Digital Device: Distributed Learning

As discussed above, most of the participants distributed individual devices to the children at the beginning of each of their classes. Although the children in Annapurna School had to share devices between two or sometimes among three due to issues with charging devices, the children in Buddha and Chadani Schools got individual devices in the lab. I saw the children work on their individual devices. In the interviews, the participants expressed their positive appreciation of the effect of the devices. Perhaps because the children had opportunity to work on individual devices, most of the participants preferred to distribute learning tasks individually. For instance:

> Anuj: They can try the same problem several times until they solve the problem, which is not possible in the classroom. In the class, I give one problem on the whiteboard that they do. There are several exercises and many practical activities on this device.
>
> Ananda: They learn things by doing, everything in a practical way. There are a lot of practice exercises they can do themselves.
>
> Anita: Digital contents are more practically oriented. Students can learn when they do things themselves. There are demonstrations that the learners can watch. They have automated voice that says 'correct' or

'incorrect'. Learners can redo the exercises where they've made mistakes. In this lab, they work on their own.

Bijen: The voice speaks: 'Do this, do that'. It instructs what to do and says whether the answer is correct or incorrect. There are learning everything by seeing, listening and doing. More than just listening, they see and learn from that.

Bhupal: They can find out if they are right or wrong themselves in many ways on this device. In the lab, the teacher is just a facilitator. We support them when they have a problem. We find out what they cannot do, where they are confused; and can check: is he doing or not? They do a lot of work themselves.

Chandra: They learn things by doing them themselves. It's more than memorising the information that we teach; they have activities they do themselves.

Ekendra: They have competition among themselves and can learn without my lecture. They ask me if they can do what they want to do. When they practice the lesson and go on to the exercises from there, they perfectly learn that. If they have something wrong, they can go back and try again and do it.

The participants' statements indicated their clear belief that learners' access to individual devices developed self-learning strategies in the lab. Their comments reminded me of the finding of Sharpe and Beetham (2010): that a digital environment provides the learners with opportunities for cultivating their abilities, habits, practices and ideas of learning.

My classroom observations confirmed participants' reports that they preferred to engage the children by providing them with individual devices to work on their lessons. The majority of participants rarely used the whiteboard in their teaching. They rarely involved the children in participatory activities in the lab. It was apparent to me that they always seemed to be engaging the children with exercises that had been loaded on the devices and so they did not think about other participatory teaching strategies. When reflecting on my observations in my field notes I recalled some studies such as by McLoughlin and Lee (2007) and Brown and Adler (2008) which have emphasised that the teachers needed to have sufficient knowledge and skills of social learning that involves social practices such as participation in groups and communities to explore knowledge and information.

Summary

The participants emphasised that the use of digital technology in their teaching generated student-centred teaching. They also stated that the technology supported their use of various collaborative teaching strategies such as group work, discussion and interaction among the learners. However, I saw that the majority of participants' teaching strategies were dominantly guided by direct instruction, programme fixed problem-solving and students' self-learning.

I reflected that freedom to work on their individual devices seemed to motivate students to actively engage with the set content, to correct their own mistakes and to sustain their attention for long periods. I noted however, that the content in each lesson was set by the teacher and sometimes explained by a short lecture at the start of the lab period. So, while students could be said to be self-motivated to participate in the set learning, they were not encouraged to set their own learning goals, and so I wondered if the process could really be called student-centred learning. The way students talked among themselves when they wanted any help with the device or with the set problems was creating an environment where sharing and peer advice were allowed and valued. Perhaps this was a first step towards collaborative teaching.

All the schools had similar arrangement of lab furniture and digital devices. The traditional kind of furniture seemed to complicate management and mobilisation of classroom resources. I observed that teachers did not change the position of furniture and the students sat on the same long benches every day when using the devices in the lab. I noted that another further challenge for teachers was the large number of students in small lab rooms. I speculated that the confinement caused by furniture at least partly influenced teachers' teaching strategies.

Interviews and classroom observations indicated that teachers sought to integrate the printed textbooks and the digital contents in their teaching. The majority tended to view the material on the digital devices as opportunity for practice of the same content as given in the textbook. However, one of the participants, Asha, appeared to see them as two different sources of teaching materials and complained that the duality added an extra burden to the task of completing the curriculum. Other participants stated that

they learned how to integrate two different sources of teaching materials in their ICT training. The teachers stated that they used both the resources mainly because the children outside the school had limited or no access to the digital technology, and indicated that if individual devices were available to the children outside the school they would prefer to using the digital devices to the printed textbooks.

The participants commented that the digital devices provided the children, particularly at-risk learners, with opportunities of self-learning, learning by doing and improving their learning. I have discussed the forms of engagement talked about by the participants in terms of emotional, cognitive and behavioural engagement. Emotional engagement of the students in the lab was observed in the friendly student-teacher relations and students' excitement about learning with the digital devices. Teachers were friendly and supportive to the students in the lab and tried to reach individual students whenever they needed help. Similarly, students talked to their teachers without hesitation and shared their problems without fear.

Cognitive engagement was observed in students' individual learning activities with the devices. Teachers explained that the children experienced freedom of learning by doing different activities on their individual devices. The various interactivity features of the devices motivated the children to engage in a range of learning activities. However, I observed that teachers were not able to reach students sitting at the corners to check what they were doing on their devices. On the positive side, I observed that the children independently accessed the learning resources on the devices, and that most had developed personal skills of using digital technology to achieve their own purposes.

Behaviour engagement was observed in the sustained and relatively independent commitment demonstrated by the students to their tasks in the lab. In interviews, the teachers emphasised children's participation in group work and interaction. However, I saw that the children engaged themselves on individual devices and seemed to prefer to get support from those who were sitting beside them.

I concluded that the teachers seemed to lack an in-depth knowledge about collaborative activities such as moving students from one group to another, organising group or pair interaction, devising discovery activities or project work, or organising

individual presentation after team work. I noted that almost all the participants tended to take responsibility for explaining content rather than allowing students to really *discover by doing*.

Nevertheless, I observed that provision of individual devices to students did allow them to solve the set problems by themselves or with the help of their peers. It allowed them to self-identify and even explore their weaknesses in specific parts of content, and to develop strategies to overcome them. I reflected that the teachers' utilisation of digital devices in their instructional activities seemed to extend and enhance the resources they had available existing printed textbooks, and I speculated that it was, to some extent, shifting from their practice from authoritarian to student-centred teaching.

Chapter IX: Impact of Earthquake in the Practice of ICT

Introduction

As stated previously while I was designing and writing the research proposal, on 25th April 2015 the 7.8 magnitude earthquake destroyed massive infrastructure, killed thousands of people, injured many more, and devastated a wide area of Nepal. The disaster created a severe situation for the survivors. Further aftershocks, mainly one of 7.3 magnitude in the following week added more difficulties to the daily life of the survivors. The crisis of food, water, shelter and other fundamental things in the disaster zones affected social, economic, education and environment aspects of life. The destruction of many thousands of schools and classrooms created a severe situation and displaced over a million children. All the schools in the disaster zone were shut for about one and half months, and even after that, many schools had to keep the children under tents and teach them with minimal resources. The situation called for the support of international organisations and nations. The immediate challenge for the communities and the government was to manage food, water, cloth, temporary shelter and temporary learning centres for the children. The catastrophe destroyed ICT infrastructure in many schools along with the school buildings and affected all teaching and learning activities. The extent of the impact of the earthquake forced me to include it as part of my research project.

The participants in my study shared their feelings and experiences of the earthquake. The participants, particularly from the Chadani, Dhaulagiri and Ekata schools, talked about the destruction of ICT infrastructure, communication systems and electricity transmission lines because these schools were in the earthquake-affected zones. They also explained that the disaster made a significant psychological impact on the survivors, particularly children. My interviews with the participants explored how they managed alternative ways of communication, various local and other support, temporary learning centres, counselling for the children, and also how they struggled to revive ICT in the schools. This chapter examines those issues.

Post-disaster Communication Services

Conversations with the participants identified communication as a particularly challenging problem immediately after the major earthquake and during aftershocks.

The participants, particularly from the disaster zone, recounted that the major earthquake destroyed most of the infrastructures in a wide section of the country including telecommunications. They stated that all the telecommunication networks were out of service immediately after the major earthquake, and it took hours to get onto the network in some places and several days in other locations. From my understanding of the context in Nepal, although the internet is available in the towns, most of the people in remote villages use mobile data to access online information. However, only 2G or 3G data would work but the mobile network was unavailable during the crisis. The participants, particularly from disaster zones, explained the seriousness of their situation when all the communication services were out of service. For example, Chitra explained that the people in his area travelled on their vehicles to find their relatives due to the lack of telephone network:

> There was not any communication with relatives. Since noontime, we had struggled to contact other relatives throughout the day, but we could contact some in the evening. Those who had vehicles travelled to different places to contact their relatives. Other people stayed in a stressful mood.

His account of earthquake indicates that the only option available for communicating with relatives immediately after the earthquake was to take the risk of travelling to different places to find them.

Chetan had a different story to tell about his two nieces who were in the house at the time of the major earthquake, and he with his other family members was harvesting potatoes on the farm. He explained that he and his other family members rushed to their house to find the children when they realised the telephone network was out of service. He added that, although the disaster destroyed his old house, the children were safe in the new house when he came home from the farm.

> We were all in the farmland harvesting potatoes. My two nieces were in the house. There was no phone network. Then we rushed to the house. My old house was destroyed when we came here. Luckily, this house was safe. Those two girls were safe here. We used to go to sleep in that old house. We could not get in to get them out because debris blocked the passage. Then we moved around, opened this house from the back, and then got them out.

Chandra from the same school stated that he experienced the loss of mobile network for over an hour, but the landline phone took some days to get back. He expressed his

frustrating experience of using mobile phone, which hardly worked when he needed it:

> It was about an hour. Bad network but mobile was hardly working. No telephone for long. I think it came to be normal after three weeks.

His comment indicates that he at least had some level of communication with his relatives on his mobile after some hours of the earthquake.

Chiran from the same school explained his painful situation of being away in the city at the time of the major earthquake. He stated that he suffered for an hour when the mobile network was out of service. However, he said that he was able to communicate with his family on a satellite phone after an hour, but he could not contact his parents in the village:

> After sometimes, I tried to contact, but there was no network. I tried a lot. After one hour, I could contact my family here on Sky satellite phone but father, mother and sister live in the village. Then I tried a relative, my sister-in-law in that village on Sky phone and got a connection. They were working after some hours but not normally.

From his account, I understood that there was at least some level of service to communicate with each other, but it perhaps left many people without connection due to high network traffic. The situation was much more severe in the area of Dhaulagiri School because the district was in the crisis-hit zone.

Deepa had a similar experience as she stayed on her farm without contact with her family due to lack of mobile network. She said it was tough for her to walk up high hills to return to her home, walking over an hour. She found her father with his hand broken with his cows, buffalos and goats dead under debris when she reached home. Her narrative reflected that the disaster victims struggled throughout the trauma when there was no communication service:

> Immediately after the disaster, everyone was in a panic, full of stress, pain, totally out of thought. NCell network was available the same night, but other networks were dead. NTC network was available next day.

Her expression indicates that, although the landline service took some weeks to get back, mobile networks were gradually available after some hours or days depending

on the impact of the earthquake in different places. Dinesh who lived in the same village explained his situation:

> All communications were completely off. Immediately after the disaster, all the communication lines were dead. Everyone had his or her relatives away from his or her families. Where were they? We did not know about them, and neither had they known. It was a painful situation for every family. Every time we tried to ring someone, there was voice 'unable to connect the network.' We did not know what the problem was. The first-day disaster took place at midday. There was no network later on that day, but we could contact people on the next day.

Ekendra from Ekata School in another district related a similar experience of being out of contact with his family and relatives when he was finishing his last day of one-week teacher training in a different district and returning home. He explained that all of his colleagues in training, including himself, could use one of his colleague's satellite mobile to contact their families for only a short time and then the service went dead. He explained:

> There was no network at all. One of the colleagues had sky phone that was working. I contacted my father on his phone because he had that satellite phone. I asked everything in a minute. After some time, that phone was also dead. I came home that evening in a taxi and set up a tent for sleeping. I think that continued for three days. When we got the mobile network, there was free calling service for everyone. Even that was such a busy network that connecting to the network was hard. It took nearly one week to come back to normal communication on mobile.

His narrative indicated how traumatic post-disaster life perhaps was for all the people living in and out of the country when they were unable to have communication with their relatives. His comment also indicates that even though the telephone service companies provided the service free of cost, the high traffic on the network kept the people in stress while trying to connect with their relatives. He reported that it was the task for his school to communicate with the families of the school's children. Because most of them were from low-income class families and lived in old houses, he added that in absence of all communication means he with his head teacher visited every child's family on a motorbike and learned about their family situation after the major quake. He explained:

> I think I was the first person who knew all information of citizens around. When we had telecom problem, I with head teacher visited all the families of our school's children on motorbike within three days and got all information.

His report illustrated how the disaster created distressing situations for the people. They could only wait to see what the situation really was because there was a complete loss of communication service or limited service with high network traffic.

The participants from Annapurna and Buddha schools explained that they also experienced frequent interruption on the mobile network in communicating with their relatives after the major earthquake. For example, Asha from Annapurna School explained her situation that she was only able to contact her brother-in-law after three days, who lived in the capital city, Kathmandu:

> My brother-in-law was in Kathmandu. He was injured while running out of his house. We could not contact him on the same day. We were very worried. I think we came in contact after three days. Then we relaxed a little. He said he also tried a lot to contact us.

The participants from Buddha School in the far-western area of the country far from disaster zone explained that there was no major problem with the communication service in their area. For example, Binod stated that he was able to communicate with other people in his area despite some level of disturbance to mobile networks:

> It was not that much effect. It was massive in the east around Kathmandu. I do not know what the problem was, but there was not the clear sound of the phone, network failure of the mobile, interruption while talking. We faced that about two days.

The narratives of these participants illustrate how the major earthquake had affected the whole communication system and kept millions of people in a traumatic situation without any communication between the families, friends and relatives for some hours in some places and some days in other areas. My own family's experience mirrored the experiences mentioned above. The narratives are significant to this study because they highlight both the importance and the fragility of ICT communication systems within rural Nepal, where severe earthquakes are unfortunately expected and recurrent events.

Power Cut and Alternatives

The major earthquake destroyed high-tension electricity transmission lines, poles, hydropower stations and lampposts. There was no electricity in disaster areas which created a difficult situation for the government bodies, international rescue teams and local people. The participants from the crisis-hit zone particularly from Chadani, Dhaulagiri and Ekata schools explained that the life immediately after the major earthquake became quite hard without electricity. For example, Chandra from Chadani School recounted that the people in his area had to rely on candlelight when the power was cut. "There was over two weeks of power cut," he said, "We used candles." Chiran from the same school shared his experience that he struggled without electricity several days after the disaster and he had to walk to his father-in-law's house to charge his mobile until he got electricity back.

> We got electricity after about four days I think. I came here from the village after four days to charge my mobile. Sometimes I used to go to father-in-law's house just across the river. After a week, we got power in our village after the transmission lines were repaired.

His account highlighted that the lack of electricity perhaps caused several other problems like a shut down of the communication service, put electronic home appliances out of service and made companies shut down. His narrative aligns with the report by Giri (2015 May 21; retrieved 2017 September 6) that stated most of the power plants in the earthquake affected zones were dysfunctional after the major earthquake on 25th April, 2015.

Other participants from the school expressed similar experiences.

> Chitra: There was a problem for nearly one week. After checking all the transmission lines, they supplied electricity in our area.
>
> Chetan: I think there was no power for over ten days. Many transmission pillars fell down, and wires were disconnected.

From these accounts, I understood that the impact of lack of electricity was experienced to differing degrees at various places depending, on damage to infrastructure. Deepa from the major affected area also reported similar situation without power for a week: "Everything was gone. The power cut continued for over a week."

Ekendra from another district explained how he and his neighbours managed to watch television when he got electricity back after three days: "I think we got electricity in three days. We extended the wire to the tent and could watch reports on television." His expression suggests the lack of electricity influenced information and communication technologies and kept people away from news and information. However, Elisha reported that the solar power that a couple of houses in her community had was the only source of charging mobiles for whole community people when there was no electricity:

> I think about four or five days there was no power. After that, the transmission wires and poles were repaired, and electricity was resupplied. There was solar energy in a couple of houses still safe. Everyone used to go there and charge their devices. Everyone was given about ten or fifteen minute time to charge his or her devices.

Her narrative illustrates how people in her community co-operated to get alternative means to charge their mobile devices, which made communication easier, and to get current information by watching television. It suggests that community co-operation could be harnessed by the government to support ICT development in villages and schools if a cohesive strategy was developed.

Support for the Earthquake Victims

When the major earthquake hit the country, destroying many infrastructures, killing thousands of people and livestock, injuring many more thousands and making millions homeless, support came from local, national and international bodies to rescue and save people's lives. Then, the Government of Nepal announced an emergency situation to rescue the injured and to provide basic needs such as food, water, clothes and tents for the victims. Immediately after the major earthquake, support came from local and national human resources, and then 34 other countries' volunteers came to help the country. The participants' narratives particularly from Chadani, Dhaulagiri and Ekata schools reflected the harsh situation during and after the major earthquake. Their reports reflected that the environment in the aftermath was full of crisis to rescue people from the debris, and to supply food, drinking water and tarpaulins for the victims. The participants also talked about the effect on schools, the temporary setting up of learning centres and the gradual regaining of normal classrooms.

Supply of Food, Water, Clothes and Tarpaulins

Disasters like the earthquake that the people in Nepal experienced in 2015 create life crises. An immediate requirement after the catastrophe was to support the earthquake victims by supplying the basic needs in the affected areas. Interviews with the participants revealed how the disaster victims received immediate relief support and post-disaster supports. From example, Dinesh from Dhaulagiri School stated that there were a range of supports for the village and the school after the catastrophe. However, Deepa described the severe situation when she and her neighbours lost their houses including everything inside:

> We had nothing to eat and no shelter. We shared whatever people in the village had. We slept in straw.

Her report indicated that many people like her family experienced the crisis of food, water, clothes and shelter in the emergency after the major earthquake. From her account, I understood that many similar families slept in straw for several nights and some perhaps did not sleep at all over many days and nights. In further conversations, she expressed her appreciation that although the supplies were meagre, food, water, tarpaulin, utensils for the villagers provided by various organisations saved their lives in an emergency.

The participants from Chadani School in another disaster-affected district expressed their feelings towards the disaster victims who survived the traumatic crisis of everything immediately after the catastrophe. For example, Chiran told the story of helpless disaster victims who lost their properties, and he explained his involvement in a community group to gather basic needs and to support the victims around his community: "Then we started to collect relief for victims and distributed it to the victims in that school area."

Other participants also reported similar crises in their communities:

> Chandra: Many groups supplied food such as *chiura* (beaten rice), *dalmoth* (fried peas), rice, cooking oil, salt and a lot of packed food. Some received tin and tarpaulin for temporary shelter.
>
> Chitra: Different organisation distributed different basic things like food, blankets, tents, beddings, and other necessary urgent things in the school area but we did not get anything here around. They said we

have our house, so they did not care about us. I got a bucket from Oxfam.

Chetan: I do not think this community was able to support each other because it was everywhere similar situation. Other organisations came here to help the people. Many supports are coming. Some organisations set up tents for the victims. There were teachers in the school area to help the victims. I involved myself in my area. Moreover, we were also in similar situation. Many people from Punjab, India came here and provided food for victims over one week I think. Many people used to go the distribution point in the morning and the evening for food.

From the expressions, I reflect that several volunteer services and supplies of basic needs saved the lives of millions of people in that emergency. Their involvement in local support teams indicates that life-relevant issues were more important than schools although rebuilding schools and classrooms was also given importance in the later days.

Impact of April 2015 Earthquake on Schools

The disaster reports and the accounts of the participants in this study indicated that schools were one of the major sectors affected by the April 2015 earthquake. The disaster created the crisis of basic needs for livelihood, but rapidly the provision of schools for children became the next priority after the fulfilment of basic needs. Rebuilding school buildings and other infrastructure would cost a huge amount of money. It was not possible to provide for the rebuilding of many thousands of schools at the same when the millions of people were waiting for food, temporary shelter, drinking water and clothes. The disaster reports indicated how much the major earthquake and subsequent aftershocks affected various sectors in Nepal.

According to Nepal Disaster Report 2015 (MoHA & DPNet-Nepal, 2015), the earthquakes killed 8896 and injured over 22,302 people and about 198 people are still missing. The education sector was one of the major affected areas in the country, which would have a long-term impact on the individual life, as well as the future of the country. The earthquake affected about 8,308 schools destroying about 30,756 classrooms and partly damaging about 16,813 classrooms. It was estimated that the quake caused the loss and damages of about US$ 7 billion (National Planning

Commission, 2015). It was expected that it would cost much more than the estimated amount in course of time.

Dhaulagiri School in this study was selected from the highly affected district. Nepal Disaster Risk Reduction Portal (NDRRIP, 2015; retrieved 2017 September) reported that 49,981 houses were fully destroyed and 23,745 houses were damaged out of 72,846 houses in the district. The portal further stated that the disaster killed 318 people and injured 1,179. It also recorded that almost all health facilities were affected and that caused a major problem after the earthquake to support the victims. When we see the record of affected schools, 92.26% (548 schools) were fully destroyed whereas 7.74% (46 schools) were partly damaged. It was apparent that the disaster created a huge challenge for the government to rebuild those schools and for the communities and teachers to run the schools in temporary learning centres.

The participants from Dhaulagiri School reported that the immediate crisis of basic survival and the destruction of school buildings, including furniture, computer labs and other necessary materials, became a great challenge for the teachers, School Management Committee and the entire community. Schools needed to be rebuilt entirely and made operational again. The participants explained that the disaster destroyed three one-storey buildings with adequate rooms for classrooms, computer lab, library, office and store by leaving one with ruptured walls unsafe to use. However, the teachers had been using the damaged building for head teacher and staff office in the same room when I visited the school for fieldwork one year on from the disaster. In the corner of the room, they had stored their left-over teaching materials, cupboard, stationery and other valuables. They explained that the loss of computer lab heavily influenced their teaching and learning activities. The teachers from Chadani School explained that the catastrophe did not heavily affect the use of digital technology. However, their experiences and feelings of the earthquake were worth examining to explore the earthquake's impact on the use of digital technology. I, therefore, asked other participants similar questions to explore their earthquake experience. The participants talked about loss of classrooms, computer lab, closure of schools in disaster zones, engaging children in temporary learning centres, psychological impact on children and ICT in schools after earthquake as discussed below.

Destruction of School Buildings and Classrooms

The disaster report recorded that all the school buildings were destroyed in the district where Dhaulagiri School is located (MoHA & DPNet-Nepal, 2015). Deepa from the school explained that she not only lost her own property but that the whole school infrastructure has also been lost:

> By midday on 25th April 2015, on Saturday the weekend holiday I was on the farm down the hill, and my father who was sick, my small nephew, my sister-in-law and my mother were at home. It was raining the whole day. When I came home after an hour, I did not see any houses around. Then, I went to see the school. All the walls had crumbled down, and that destroyed computers, library, furniture and all official documents. Luckily, the tin roofs were standing on iron rods.

From her story, it was clear that in the immediate situation after the 7.8 earthquake it was very difficult for the survivors to manage their shelter, food and drinking water. Another challenge for the school was that how to remove the debris of the school buildings and manage the classrooms for teaching and learning after opening the school.

Dinesh from the same school shared a similar story and expressed his frustration with not being able to save the computer lab and other important documents, which were under the debris. He explained:

> I went to the school. Everything of the school was destroyed. None of the building walls was there, but the tin roof was still standing. Our head teacher and I went to see the school though we were also suffering from the same disaster. We could not go into the buildings because all the walls were destroyed. All the inner walls were on the floor though some of the outer walls were just cracked. Going inside was dangerous. We thought to save some of the school properties using logs to support the roof. We did so for the day. We dragged some important things in the centre of the room so that the rest of the hanging walls would not damage them. It was not possible to pull out shelves. We tried to save some of the computers, but they were not working later when we tried to open them. The library and the computer lab were in the same room. We could not save the library and computers.

It can be seen that the disaster created unexpected challenges of rebuilding the classrooms, reviving the computer lab, re-establishing the library and managing furniture in the school after the priority of how to survive in the crisis. His statement

about the impact of the disaster on his family reflected his feeling of pain. From his painful story about the loss of his house, shed and everything inside the house, and immediate crisis, I understood that the people in the crisis zone had a severe time looking for emergency support, and then their second priority was perhaps the school for their children. When visiting the school during the data collection one year after the disaster, the crumbled house debris, temporary shelters made up of tin, and ruptured walls of the houses in the village were evidence of what the community had suffered. When I observed the one-story school building, marked unsafe, used for the head teacher's office, staff room and for storing materials due to lack of rooms, I was overwhelmed by how the teachers, head teacher and the community struggled to reopen the school and normalise their teaching activities after the disaster. The majority of villagers were still living in temporary sheds covered with tin at the time I visited one year after the disaster and their living conditions reflected how the major earthquake and aftershocks affected the social, educational, economic and environmental aspects of people's lives.

The reports by ICIMOD (2015) and NDRRIP (2015; retrieved 2017 September) also indicated that the earthquake impact on the education sector was high. The earthquake destroyed almost all the government school buildings and partly damaged some in districts where the disaster fully destroyed over 91% houses. The report stated that most of the partly damaged school buildings were unsafe to live in. In the case of Dhaulagiri School, one of the organisations supported the school to rebuild the prefabricated walls of buildings to run classes. However, they could not rebuild rooms for the library, computer lab, office and others. After observing the head teacher's office, staff room and rest of the packed materials in the same hall, which was marked unsafe by the inspection team of the government, I questioned Deepa, and she replied:

> Most of the time we are in the classrooms or outside in the ground. We just come here for collecting and storing materials. We are few teachers, and we can run out in case we feel tremors. We have no other option.

From her account, I understood that they were unable to build a new building for the offices, lab, library and store. They were risking their lives under that unsafe shed that could crumble down with a minor tremor.

The earthquake affected Chadani School, in another district, comparatively less. However, the destruction of one of the school's buildings complicated the teaching environment immediately after the disaster. For instance, Chandra, who lived near the school, explained:

> I ran to the school immediately after the earthquake and saw one of the buildings cracked. We are building a new one there now.

However, two other buildings were still safe. Chiran from the same school explained the reason why those buildings survived the earthquake: the school had refitted one of them just two months before the earthquake and the other one-storey building was made of cement, concrete and iron rods:

> One of the old buildings was damaged. Another old one was retrofitted just two months before the earthquake.

Chetan stated that the cemented concrete building saved their computer lab and the teachers were able to use the devices in their teaching activities. However, the participants' comments indicated that the lack of sufficient rooms for the classes influenced their normal practice, which is further discussed in the following pages. Nevertheless, from my observation of the under-construction building foundations, I formed an impression of the limited space in which the teachers had run their school, merging both the head teacher's office and the staff office into one room. However, Chitra expressed his appreciation that a local organisation supported them to rebuild the new building:

> We demolished the one severely damaged by the first-day earthquake and we are rebuilding a new one with the support of an organisation.

Further conversations with the participants explored that they had to struggle to find resources to rebuild the school and recreate a learning environment in the school. In an informal conversation with Chetan, he mentioned that the school head teacher had faced difficulties in managing the fund for the construction of the new building when there was no support to rebuild the school from the government.

The participants from other schools in the study reported that there had not been a major impact of the earthquake on their teaching activities. Ekata School, although it was in the disaster zone remained safe without any physical damage. Elisha's

experience about the earthquake indicates that they did not have major issues in running their school after the catastrophe:

> We were safe because this building was earlier retrofitted. When we came to open the office, even the glass with water was normal on the table. Computer lab, library and all other things were all safe. These computers were in packets.

As long as their school buildings survived the major earthquake, she stated that they were able to conduct their teaching and learning activities without major issues except some of the children suffered trauma because of the tremors. However, she said that all the schools including hers were shut down for about one and half months after the major earthquake. The participants from Annapurna and Buddha schools stated that they did not have major impact from the earthquake, as they are located outside the disaster zone. However, the participants from those schools expressed their experience of tremors. Anuj, from Annapurna school in the region to the west of the location of Chadani, Dhaulagiri and Ekata schools, explained that, although there were hairline cracks in the walls of one of the school buildings due to the earthquake, there was no major damage to the school buildings. He added that the inspection team from the local authority marked the school buildings as safe for running classes:

> There was not any loss, but the houses were cracked, even our school walls and my house too. Later people from VDC came to observe, but I did not care about that. This was minor beside the huge loss in other parts of the country.

Ananda, from the same school, showed me the threadline cracks on the walls while having a conversation in the same building. He stated that they continued their teaching activities normally when thousands of schools had been shut for about one and half months in the major affected areas.

The story that Deepa and Dinesh from Dhaulagiri School, in a crisis-hit district indicated that there was urgent need of help immediately after the earthquake to rescue people and cattle and to provide food, drinking water and temporary shelter. The priority was given to food, shelter and the other requirements. The participants expressed their frustration towards the government bodies, as they did not get any immediate supports for their own survival and for that of their school. MoHA and DPNet-Nepal's (2015) post-disaster reports also indicated the issue that the search

and rescue teams failed to reach the villages in remote hill and mountain areas in due time. The report also stated that there was delayed or no delivery of services to the affected people and unsystematic mobilisation of the 4521 team members from different 34 countries.

Long Closure of Schools

From the comments of the participants, I understood that Dhaulagiri School was the major earthquake-affected school whereas the disaster only partly affected Chadani School. Annapurna and Buddha schools did not experience any major impact from the earthquake. Ekata School was safe from the disaster although it is located in the disaster zone. The participants, particularly from Chadani, Dhaulagiri and Ekata schools, talked about the effects of the catastrophe in terms of social, mental and physical aspects. From their accounts, I realised how severely schools were affected by the April 2015 earthquake. The disaster reports as mentioned above also indicates that the earthquake created a crisis in the education sector, which would have a long-term effect on the country.

The immediate challenge for the schools, community and the government of Nepal was to rebuild classrooms for the children and reinstate teaching and learning in a normal way. Because of the priority for saving lives and massive destruction of infrastructure, the participants, particularly from the disaster zone, stated that the Government of Nepal circulated a public notice to close all the schools in the affected regions immediately after the major earthquake. Then the schools in the affected zone remained closed for about one and a half months until the government published a notice to re-open the schools. However, participants from Annapurna and Buddha schools located outside the disaster zone stated that they continued their school programmes as usual, as they suffered a major impact. For example, Bikesh from Buddha School said, "We opened the school as usual." He also shared his experience of tremors and interruption in phone network immediately after the major earthquake.

The experiences of the participants from the disaster zone reflected that human survival took priority over schooling. Nevertheless, their accounts reflected their traumatic experiences of managing classrooms, infrastructures and learning materials for children. For example, Deepa from Dhaulagiri School shared her experiences that, because the teachers had to deal collectively with problems such as managing a large

number of students without any classrooms, lack of teaching and learning materials, children in trauma, the situation would not have been favourable to open the schools immediately after the disaster. She said:

> We shut the school for about one and a half months. We were in no mind for trying to manage the classrooms because there was no classroom at all. We could not think about it immediately after the first-day earthquake.

She stated that there were more life-related needs to focus on. She added that it was unfortunate for them because they had already distributed textbooks to the children just one day before the major earthquake, and the books were destroyed along with their houses. She explained further that the immediate problem in the school was to provide a room for kindergarten children although the provision of classrooms for senior children was also equally important. UNOCHA (2015 June 3) reported that there were about 1.1 million affected children in 11 severely affected districts in the country.

Chitra from Chadani School in another district also shared similar experiences in his school, although they had not lost all their buildings:

> We closed the school for about one and a half months. How can you run the school in that situation? It was the situation when everyone had to be on his or her own to be safe. They had to save their remaining belongings and their family. That was the priority.

From his account, I learned that life-related problems became major reasons to shut down the schools for such a long time. However, from the participants' responses from Dhaulagiri School, I also learned that the reasons behind closing the school were not only survival challenges but also the loss of school buildings and all infrastructure in them. The closure of thousands of schools impacted on all educational activities in the disaster zones.

Temporary Learning Centres (TLCs)

From the participants' narratives above, I understood that the challenge in the disaster-affected zones was to rebuild the destroyed school buildings. Deepa from Dhaulagiri School explained that there was no classroom in which to run the school when they reopened the school after one and a half months. She praised the effort of her head teacher who communicated with District Education Officer (DEO) and got a

tarpaulin to set up a temporary learning centre for children. She added that they organised the children in various groups and entertained them sharing their problems and creating fun to give them relief. She explained:

> Our head teacher brought a tarpaulin from District Education Office. Then he provided nine tarpaulins that we used to separate classes. We did not teach lesson for some ten days, but we shared experiences.

Her account reflected that teachers in the school did not have classrooms to teach separate year groups for a long time. It sounded as if the temporary learning centre was for emotional support and recreation rather than for teaching the curriculum.

Dinesh from the same school explained that the teachers, as well as the students, had to sit on the floor and engage the children in various entertainment activities when there was no blackboard, duster, other stationeries and furniture.

> We cleared the debris, but it was hard to get sufficient tarpaulins to set up tents. We contacted the DEO to provide some tarpaulins, and he provided some. There was no wall, but the tin roof was standing on iron rods. We separated the classrooms with tarpaulin and kept the children there. There were cracked floors, with potholes and faults. There were no blackboard, chalk or duster. We kept the kids in the room and tried to entertain them.

He added that the recreational activities continued over a week after opening the school to get the children over the shock of the disaster. He also said that temporary learning centre they made in the school with tarpaulin was the only option until they rebuilt the classrooms.

When Chadani School lost one of its buildings, it created a problem of managing classrooms immediately after opening the school in about one and half months. However, the school's teachers explained that they temporarily managed the classrooms to run the school. For example, Chandra explained that they kept the children in the building unsafe marked and taught the children there until they got an alternative space:

> The only two-room building was damaged. We did not have spare rooms in other buildings. Therefore, we kept the students in the same damaged building, but outside during lunch.

His account indicated that there was an obligation for the school to keep the children in unsafe damaged rooms.

Chiran from the same school blamed a government official who visited the school and advised them to keep the children in the damaged building. Before that, they had been teaching at a temporary learning centre they set up with tin sheets in the school ground:

> Outside in the ground we had a temporary living cottage made up of tins. One day a Government official) came and asked us to keep the children in that damaged building, that it was not high risk in that building. Later one organisation funded for that two-room cottage where the early child group are staying.

Also, he expressed his gratitude to a local organisation, which funded the building of a new block. It was the same two-room building he showed me where the pre-school children were when I visited the school.

Psychological Impact of the Earthquake and Counselling in the TLC

The psychological impact of the earthquake on the minds of children was one of the issues the participants highlighted in interviews. The participants from Chadani, Dhaulagiri and Ekata schools recounted their experiences and feelings as well as the experiences of the children in the schools. For example, Chiran from Chadani School shared his experience of the earthquake:

> I was on my motorbike in Jawalakhel (*a part of Kathmandu city*). When I was just taking a turn at the roundabout where there is a statue of ex-King Birendra, I felt shaking and thought I had a tyre puncture. I hardly controlled the bike and stopped there. Then I walked to the open space where hundreds of people gathered all of a sudden. After sometimes, people shouted that a tiger had escaped out of the zoo. Oh, my God! Everyone ran over one another. It was impossible for the tiger to jump out of the cave, which is surrounded by high walls. After sometimes, I tried to contact my family, but there was no mobile network. I tried a lot. After one hour, I could contact my family here by Sky satellite phone but my father, mother and sister live in the village. Then I tried a relative, my sister-in-law, in the village on Sky phone and connected. She was so scared while she was speaking over the phone. She said, 'All the houses collapsed. We are in the farmland. Where are you?' There were several tremors after the major one. When I came here (*his house near the city*), I saw everything destroyed. Many houses collapsed. Who could go to the village where my parents were? It was not easy.

His story seemed to represent those of millions of earthquake victims in Nepal. It reflects how he was confused in his mind and could not take an immediate step forward to find his relatives. He also told a frightening story of how he experienced the major aftershock on 11th May 2015.

> We had a psychological counselling training for the teachers in a school the following week just after 14 days of the first major earthquake. When we were about to start the programme, there was another big one of 7.3 magnitudes in the mid-day. We ran out of the three-storey building to save ourselves. Then the programme was cancelled, and we left for home. I was prepared to escape, so I was sitting just inside the door. When I felt the earthquake, I did not realise how fast I was in the open ground. Everyone was screaming and shouting.

His story indicates that he had the effect of the major earthquake on his mind and that kept him in a state of extreme alertness on the day of major aftershock. From his story, I realised how important counselling was for the children to bring them back to normal state of mind and prepare them to go to their school normally.

Chitra's narrative from the same school reflected that everyone after the major earthquake had some degree of mental shock. They had lost their houses in the disaster, and hundreds of people made the school a shared shelter for many weeks. He explained that everyone was in the same situation of needing support:

> There were many who stayed in the school for many days and nights. When the government announced to shut down schools, I did not go to the school. I used to get information frequently and communicate all the time. I had my tension of losing sheds and house. There was no place to stay after all. Everyone was in the same situation. None was in a position to help others. We had to set up everything to survive on our own. I was so busy doing my work; managing food, clothes, shelter, fire to cook food, and everything.

His stress of managing basic needs for the survival after he had lost his house indicates that he also needed support to overcome the stress of the disaster.

Chetan expressed his appreciation that several volunteer teams organised various recreational programmes such as music, dance, games, and colouring pictures for the children under the tent on the school ground and that worked as a medicine for healing the trauma of the disaster. He further added that the volunteers' counselling of the children reduced their fear and prepared them for learning in the classroom. He

explained:

> Many people came and stayed many days. Children needed counselling. Many of them entertained the children, played with them, danced and had fun with them every day. That was so valuable in that situation. Many children lost their houses. Counselling was necessary for them.

Chetan explained that some children were still suffering shock from the earthquake when they re-opened the school:

> There were many, but a couple of girls had a high level of shock. They could not bear to hear the word 'earthquake' shouted. Even now, my daughter who is in class four has still that fear.

Deepa from Dhaulagiri School shared a similar experience, saying that some children in her school continued to suffer from the fear they felt in the major earthquake. She said it was a challenge for teachers in her school to handle children with mental stress over six months. She further explained that the children' parents used to drop their children at the school and pick them up from the school in the afternoon, and sometimes the teachers used to drop some of the children at their home after school.

> Some of the children had continuing mental shock because of the tremors. They were scared of the wind blowing, of shaking leaves. When the kids felt the wind blow and saw leaves shaking, they used to scream. We used to drop them to their house. About 15 children had that shock for nearly six months.

From her account, I understood that, although she did not highlight the medical cases, the children felt a long-term mental effect of the earthquake and needed attention to get them over the mental shock and be able to sit in a classroom for regular teaching and learning.

Dinesh from the same school also reported his experience that children showed scared behaviour even when they felt the minor blowing of wind, movement of trees and sound of any object dropping. He reported that it did not become a severe medical issue although the children suffered from mental stress. He expressed his esteem for the work of volunteers, who spent over a week for counselling the children in a temporary learning centre, significantly healed the mental effect of the earthquake and changed the feeling of the children:

> We used to convince the children, but they had fear in them. They used to say, 'There will be more earthquakes my grandpa said; my grandma said; my mum said; my dad said.' Some children were feeling mental stress. It was not a high medical issue, but they had fear and mental shock. Sometimes, just a minor shake and sound on the roof used to frighten them. They used to scream.

Elisha from Ekata School in the next district recounted a similar situation in her school. Similar to Chadani and Dhaulagiri schools, the volunteers from an NGO organised various entertainment programmes under a tent in the school ground for the children and engaged them during the crisis period:

> The school was closed after the disaster but CWISH, an NGO, established a camp for child counselling. There used to be over 300 children there every day. They engaged all the children in several activities – drawing, games, singing, dancing, and much more. It diverted their minds towards having fun and healed the effect of the disaster on their minds.

However, the participants from Annapurna and Buddha schools stated that there was no such case in their schools as there was no major impact of the disaster in their schools and areas.

ICT in Schools after Earthquake

After they had lost the computer lab in the earthquake the teachers in Dhaulagiri School had to change their way of teaching. Because the disaster destroyed all buildings and properties including the lab, one of the most expensive properties in the school, they had to engage the children in the tin wall room when they had no classrooms.

Participants from Dhaulagiri School expressed their frustration about not being able to find support when the school lost all the school buildings and computer technology in the earthquake and looked for external support to revive the computer lab. Their comments indicated that they had to return to their traditional way of teaching and they lost hope of regaining their practice of teaching and learning with digital technology. Deepa explained that the disaster destroyed their technology and brought turmoil in the aftermath. She added that it imposed the way of teaching and learning like a reverse path to the traditional practices:

> The quake destroyed our computer lab in April 2015. We talked about it seriously. It is not possible without technology because we had been used to it and the children as well.

She expressed her frustration about teaching without digital contents and relying on printed textbooks similar to previous times. Dinesh's expression from the same school also alluded that with the damage of computer lab the teachers had to return to their previous teaching strategies before they adopted the technology in their teaching activities:

> We tried to save some of the computers, but they were not working when we tried to open them. Library and computer lab were in the same room. We could not save the library and computers.

The participants from Chadani School stated that the impact of the disaster on the use of digital technology was observed as the academic year progressed when the school could not immediately manage sufficient rooms for teaching and learning.

> Chitra: Lab was under the one-storey building. It was safe, but we did not use it as usual after the earthquake.

> Chandra: It was safe, but we could not use it a lot last year.

Their statements reflect that the earthquake seriously reduced the post-disaster use of digital technology. From their narratives, I understood that the loss of a school building, school closure for one and half months and time for managing alternative rooms for classes reduced their normal use of the lab in the year.

The earthquake created a great impact on the teaching strategies in Dhaulagiri School where the teachers had to return to their chalk and talk, forgetting the use of digital technology they had become familiar with. It seemed that the loss of technology created frustration for the teachers, which is discussed in the following pages. From the statements by the participants from Chadani School, I understood that, although they had experienced some influence of the disaster on their regular practice after the earthquake, it gradually became normal in the following academic session.

Local, National and International Support for Schools

From the participants' accounts, I understood that the major earthquake mainly affected Dhaulagiri School and partly affected Chadani School as discussed above.

The participants explained that they received various kinds of support from local, national and international organisations to rebuild the schools and resettle students in their classrooms. Anuj from Annapurna School, which is located outside the disaster zone, stated that every government official contributed his or her one-day salary to support earthquake victims and rebuild infrastructures. Chitra from Chadani School explained that volunteers from other places came in his area to help the victims and they built temporary shelters for them. Chetan remarked, "I do not think this community could do that as it was damaged everywhere."

Dhaulagiri School in the crisis-hit district had a much more severe problem immediately after the major earthquake. In our interviews, the participants from the school explained that various groups of volunteers visited their school, supported the school community to remove the debris, created fun for the children in the school and engaged them in various learning activities after the disaster when the teachers did not have classrooms. For example, Dinesh expressed his appreciation to the volunteers in his school:

> A political alliance group came to do the job. Many stayed for a week there under tents. They collected shovels, spades, *doko* (basket) and other necessary tools from the village, dug the debris and cleared away the whole debris in about a week working together with the community people. Well, we cleared the debris, but it was hard to get sufficient tarpaulins to set up tents. We contacted DEO to provide some tarpaulins, and he supported us with some.

His narrative highlights how tough the immediate situation was after the earthquake and what challenge it was to rebuild the buildings, classrooms, furniture and other essential things and reinstate the teaching and learning environment in the school. At the same time, Dhaulagiri School had additional issues like the need to re-establish its library and computer lab.

Rebuilding Schools

The interviews with the participants from Dhaulagiri School identified that the destruction of school buildings created a harsh situation for the teachers, school management team and community, and that they needed to find a huge amount of support to rebuild the classrooms and other infrastructure in the school. The situation was perhaps similar in Chadani School, although comparatively less severe, where the

major earthquake damaged one of the buildings and so created a challenge for the school to provide alternative classrooms until they rebuilt new ones. The participants from the schools stated that the government alone would not be able to rebuild all the schools the disaster destroyed. In that situation, community, local organisations, several international organisations and other countries supported the Government of Nepal to rebuild the destroyed school buildings and classrooms. Chandra's criticism of government agencies for not supporting their school indicated that state aid did not reach all the remote villages. Moreover, his praise for the work of community people who became actively involved in demolishing the damaged buildings, clearing debris and gathering necessary materials to rebuild the classrooms, highlighted how effective the united effort of the community people was. He explained:

> There was no any task force. We did it ourselves. We gave the tiles and bricks free of cost to other people who could clear the debris. There was no any support from the government body. Youth Foundation, a local organisation, donated one of the buildings, where the toddlers are sitting, and the other one under construction is by the Rotary Club. The local people carried bricks, gravel, sand and other materials to build the school buildings.

His comments underscored how the effort of community people and local organisations could strategically resolve community problems without dependency on government support or foreign aid.

However, it was a much bigger challenge for Dhaulagiri school, which lost three buildings at the same time. Deepa from the school explained that funding from an international organisation supported them to rebuild the classrooms of the school: "One organisation from Netherland rebuilt the prefabricated walls. Everything we repaired." She added that the teachers gradually moved the students into the regular classrooms when they got the infrastructure repaired. By the time of the interview, after one year of the disaster, she pointed that they still lacked a room for a library and a computer lab, even if they could revive them in the future: "We do not have a room for library and computer lab. We are just managing rooms for classes." From her words, I understood that, although the funding from the international organisation as well as the workforce from the community played vital role to rebuild the classrooms and regain teaching and learning environment in the school, the school still could not provide space to house the expected revival of the lost library and computer lab.

I reflected in my observation notes that the head teacher's office, staff room and several packed materials in a room under a building that was marked unsafe seemed to be reprehensive of other such schools in remote villages waiting for external support to rebuild necessary rooms.

Lack of Support for the Computer Lab

The participants from Dhaulagiri School, as mentioned above, not only lamented the loss of computer lab along with school buildings and the challenge of rebuilding but also felt that the loss of the lab took the teachers and learners back to previous teaching and learning strategies. The participants from the school stated that none of the initiatives by the school head teacher, School Management Committee and the community were able to find any source of funding for the computer lab, and neither did they find a means to fund new equipment. However, Deepa expressed her dissatisfaction with the role of the head teacher for not playing an active role to reach the high-level government body to get support from the national and international organisations:

> I talked to head teacher several times. Let's try out from every source. Anyhow, we must manage this lab again. We need it for the children. But he seemed not very positive.

From her comment, I understood that he was not proactive in exploring resources to restore the computer lab and it perhaps demotivated teachers in the school to work efficiently. She claimed that she shared her ideas with her head teacher, colleagues and the members of School Management Committee to explore gaining resources and getting funds to reinstate the lab. She criticised their attitude of waiting for support from politically affiliated bodies. She explained:

> I personally suggested to them to search different organisations, contacts and make a link if we cannot do ourselves. I am quite unhappy with the way the people here look towards political parties.

Her focus on the re-establishment of computer lab indicates that, although the school lost the technology, she had not lost her interest of using the technology in her teaching and learning.

Dinesh did not like to speak much about the issue, but his comments suggested that the responsible bodies of the school had political aspirations even in the management of school:

> There is politics everywhere in School Management Committee formation, fund management, construction of building and so on.

From his refusal to answer my repeated questions about the place and role of the associated bodies in the school and their relation with political alliances, I understood that disclosing such issues might create a risk for someone with a temporary job and so I simply asked him to speak about computer technology in the school. Because he was the teacher representative on the School Management Committee, he focused on the re-establishment of the computer lab. He said:

> If I get such a chance and there comes any fund in the school, I will try to convince the head teacher and School Management Committee to invest in the computer lab.

He suggested that the school administration, School Management Committee and the community could collectively make an effort to organise funds for reviving the computer lab and library to regain the use of ICT in regular teaching and learning in the school. He was suggesting that, without waiting for external funding, the school could raise a fund from their community to revive the technology and reinstate technology-integrated teaching activities in the school.

On the one hand, the comments of the participants indicated that they lost their hope to acquire funds to purchase new computers, digital toolkits and other technologies for the lab because they lacked a collective voice among the administration, School Management Committee and the parents. They also stated that various factors such as the political alliances of the teachers, members of School Management Committee and other people in the community, the low-income status of the parents and less educated people in the community entangled the situation. On the other hand, their concern towards the loss of new technology reflected their enthusiasm to have the technology back to their teaching and learning.

Teachers' Concern, Expectation and Interest for ICT

The discussion in this chapter reflects that the teachers from Dhaulagiri School were highly concerned about the loss of the ICT and for not being able to revive it. They stated that the school searched various resources to find support for the re-establishment of the computer lab. They expressed their frustration that their all attempts were unsuccessful and not able to revive the technology in the school. Deepa, who had been teaching at the school for seventeen years, asked me if I could help them to find a means to fund their computer technology. From her question, I understood that she had both despair and expectation. However, both emotions contained her enthusiasm for the use of ICT in her teaching. In further conversation, she emphasised the need of ICT for the new generation and explained that the teachers had become accustomed to teaching with digital devices:

> We talked about it seriously. It is not possible without technology because we have been "used to" do it, and the children have as well. It is inevitable for this generation. Even vocational subjects have chapters about ICT or IT, which is a problem for us to teach, but we have to do it.

Her statement reflects that, although the school lost the technology and could not revive it after the disaster, Deepa had enthusiasm for the use of the technology in her teaching activities. She suggested that an organised effort by the School Management Committee and the community could explore the right source of funding for their school's lab:

> The SMC has to find people in the community who can search links to the sources. The community people must have an open mind to bring property for the community. School Management Committee must understand the teachers and support them.

Dinesh described the situation of the school and expressed his despair to access such a huge amount of funding for the computer lab in their school. As a teachers' representative on the School Management Committee he found difficulties to access the resources without political power:

> We are facing some issues. Those who have political power get an easy way to the resources.

However, his earlier argument indicates that the political alliances of the school's responsible bodies, different people in the community and teachers created complexity in the working environment of the school. From his comments, I reflect that he did not have much hope to get support from any external organisation and neither from the government because the government did not have a funding plan for primary schools' computer lab, as discussed in the previous chapters. However, his statements reflected that he still had interest in using digital technology in his instructional activities. Dinesh's comments reinforced the emerging picture of the complexity in introducing, resourcing and maintaining technology in rural schools in Nepal.

Summary

The major 7.8 earthquake on the 25th April 2015 and the following week's 7.3 aftershock created a severe crisis mainly in 11 districts, although the impact of the disaster was experienced in 53 districts. It killed thousands, displaced millions and left millions of people in a traumatic situation. In the post-earthquake situation, when at least 8308 schools lost classrooms and other infrastructure, over 1.1 million children had been affected. Although the initial estimate of losses due to the disaster was estimated at about US$7 billion from the post-earthquake evaluation, costs would later increase to include the cost to rebuild all the schools' infrastructures.

In the interviews, the participants, particularly from Dhaulagiri, Chadani and Ekata schools, recounted their severe experiences of the disaster and their feelings about it. Their accounts reflected how they had to live in tents, sleep in straw and share what little food was available with neighbours. The discussion also highlighted how the disaster destroyed and damaged some of the infrastructures of electricity and telecommunication, which caused problems in information and communication systems. In the absence of electricity, the people relied on candles or lived in the dark for several days. Likewise, the lack of telephone services left people in a traumatic situation without being able to communicate with relatives. Some of the participants commented that they got phone service back after some hours or days; others remained unconnected due to high network traffic.

Participants' narratives in the interviews reflected how they suffered a lot to remove debris from the school, rebuild the classrooms and resettle the children in their

classrooms. They related that various volunteer groups and international organisations supported them to reconstruct the school classrooms and to create fun activities for the children immediately after the major earthquake. The recreational activities such as music, dances, games the volunteer groups conducted in the schools for many days worked as a therapy to get the children rid of traumatic stress.

Dhaulagiri School, which lost almost all its infrastructure including school buildings, equipment and particularly its computer lab in the earthquake was one of the most affected schools. The disaster report shows that the earthquake destroyed 92.26% of the schools and damaged 7.74% schools in the district where Dhaulagiri School was located. In this way, the situation in Dhaulagiri School represents the severe post-earthquake environment of many schools and the teachers' struggle for regaining classroom teaching.

The loss of the computer lab in Dhaulagiri School changed the teachers' teaching strategies. The interviews with the participants identified issues that intensified the problems, particularly no funding from the government for replacing technology, the weak role of the head teacher in coordinating School Management Committee, teachers and community to explore external resources and some level of political influence in the school environment. This raises a question whether the head teacher's leadership did not work well or whether his own teachers did not support him. However, the teachers' concern about the technology reflects that they had not lost their enthusiasm for using the technology in their teaching activities with the loss of the entire computer lab.

Chadani School in another affected district also had impact from the earthquake, but relatively less. The teachers' accounts showed that, although they had trouble to use the digital technology as usual after the earthquake had destroyed one of the school buildings, they gradually regained their usual stamina in the following academic session. The support of the local organisation, which funded for rebuilding the classrooms in Chadani School, seemed to be significant for the teachers to organise sufficient classrooms and regain their practice of digital technology.

Although I had not expected it when I initially planned my study, this account of the impact of the earthquake is very significant to an understanding of how ICT can be

implemented in rural schools in Nepal. Not only does it show the vulnerability of educational development in the face of recurring natural disaster, it also indicates the importance of technological development not only for education but also for communication that could increase the survival and recovery of villagers in future earthquakes.

Chapter X: Conclusion and Recommendations

Key Findings

This chapter presents a summary of findings from the study. It draws connections between Nepal's ICT education policy and worldwide ICT development. It summarises how the Government of Nepal works to integrate ICT in education and what risks are involved in its current strategy. It then reviews how primary teachers use digital technology and how the technology supports their instructional activities in the classroom. It also reviews how the earthquake has impacted on the use of ICT in rural schools. Finally, it makes recommendations for policy and practice.

Status of Teachers

As detailed in Chapter V there are five category teachers in government schools: permanent, temporary, *rahat* or relief quota, Per Child Funding [PFC] and private. The majority of teachers have permanent status which leads them to retire on a pension, but all other status teachers end up without the facility of pension. Whereas permanent teachers are appointed following the procedures of the Teacher Service Commission, other categories of teachers are appointed by School Management Committee of each school. Although the teachers on permanent, temporary and relief quota get almost the same salary, the teachers on PCF and private status are generally paid a low salary that is negotiated at the time of appointment. Comments by participants in this study indicated that the varying status of the teachers is a contentious issue in community schools.

The participants in this study commented that differences in their salaries influenced their motivation in performance of their work as teachers. Some expressed the opinion that their head teacher would not be able to equally distribute jobs to those teachers who had variation in salary. Others stated that the variation in salary created humiliation and frustration in teachers and so tended to impact on their professional practices. Participants' comments indicated that teachers who were on temporary, relief quota, PCF and private status had a fear of losing their job at any time when the government might send a permanent teacher in their place. Their expressed fears alighted with the findings of Poudel (2014) who claimed that this is a national problem and that employment uncertainty influences the execution of school plans,

teachers' teaching activities and quality of education. Because teachers are the primary agents in the development of new teaching approaches, their sense of professional agency is important to successful introduction of ICT into education. The existence of insecurity and unequal bases of employment would seem to provide an unstable platform for encouraging motivation and responsibility for critical inquiry into practice and for strategic development of change.

ICT Infrastructure and Training in ICT Use

In investigating what digital technology was used in teaching and learning, it was found that three out of five schools involved in this study had a functional computer lab where there were mobile devices [XO laptops] specifically designed for teaching and learning. One of the other two schools had lost its computer lab in the April 2015 earthquake and could not revive it. Another school kept the technology in the lab without using for over two years. It was found that the digital devices contained course contents of Nepali, Maths, Science and English subjects, and that e-libraries contained thousands of e-books and audio-visual materials and that these were not internet dependent. These schools did not have internet facility, but the organisation which installed the technology in the schools provided the schools with both on-call distance technical support and occasional personal support by visits to the schools. It was found that the digital content in the devices was predominantly practice-oriented. Moreover, students and teachers had access to the technology only in the school, but not outside the school. Chadani, Dhaulagiri and Ekata schools could have accessed an internet facility in their areas if they had been able to afford the cost and if they had considered that the benefit of using the internet in teaching and learning justified the cost. However, Annapurna and Buddha schools had a lack of internet infrastructure in their areas.

This study found that the participant teachers had received two kinds of teacher training: the government had provided generic teacher training which does not cover ICT education, and an NGO provided training in the use of ICT after providing ICT infrastructure for their schools. The interviews with the teachers in this study indicated that government provided training was focused on the generic teaching methods. However, the ICT training provided by the NGO emphasised basic computer skills focused on how to use the digital devices and its applications in

teaching the curriculum of various subjects. The evidence from this study has shown that most of the teachers had a positive perception of the ICT training they had received and that this had developed their confidence in using new technology in instructional activities. However, the teachers were not satisfied with the training provided by government: they complained about lack of specialist trainers, the use of their colleagues as trainers, and about negligence of the Resource Person and School Inspector in conducting training. Many of the participants articulated opinions that government training programmes were conducted with the intention of getting allowances, and that they appeared to be more a formality than actual opportunities for professional development.

Use of ICT

This study examined teachers' understandings of ICT integration in their instructional activities and how they used digital technology in their teaching. The study found that teachers perceived digital technology as a positive teaching tool, as one which changed their traditional teaching strategies to include collaborative activities and student-centred teaching. Their responses indicated an understanding of student-centered teaching with digital technology in terms of changed student learning behaviours, motivation to use digital devices and freedom to select and pace the exercises they practised on their devices in the lab. However, the teachers set learning goals and content in each lesson but did not encourage the students to set their own learning goals and did not involve them in group activities. Instead, they often seemed to prefer to engage students in doing the exercises based on the lesson they had already learned in their regular classes and consistently practising it until they got the right answer. The study found that the students gave each other peer support in solving learning problems on their devices and in general communication with each other while being on their devices in the lab and suggested this could be the beginning of the development of a collaborative teaching strategy.

The study also found that the traditional set-up of the classrooms and furniture were obstacles and made it difficult for the teachers to mobilise learners and engage them in group activities. Moreover, a large number of students in a small lab room influenced the teachers' teaching strategies. The teachers seemed to have limited knowledge about how to create a collaborative learning environment by engaging the

learners in various groups, interactivities or individual presentations after team work. Instead, almost all the teachers preferred to explain content rather than allowing the learners to work themselves and learn in their own ways.

This study found that teachers had developed two situations for teaching the same content: in the regular classroom and in the computer lab. The data showed that the teachers used government prescribed printed textbooks in the regular classroom and digital devices in the lab to teach the same content. The majority of teachers perceived that the digital devices provided the learners with an opportunity of practising the content they had learned from the printed textbook in the regular classroom. However, a few participants criticised it as an extra load for the teachers and one that interfered with the task of completing the curriculum in time. The evidence from this study has shown that, while the students and teachers did not have access to the technologies outside the school, they used both printed textbooks and digital devices. Such a strategy of using digital technology seemed to be augmenting the existing teaching strategies rather than actually transforming traditional pedagogy. However, several teachers expressed the opinion that, if the devices were available for each child to carry with them wherever they would like to take them, then students could rely on digital devices and would not have to use printed books.

Transforming Classroom Culture

Interviews and observations in this study indicated that there have been some developments in classroom culture which suggested a shift from traditional pedagogy to student-centered teaching. For example, the change in student-teacher relationships in the lab could be seen as a paradigm shift replacing the authoritarian teaching environment of some years ago where the teacher was ranked at a higher level and student at a lower level. About a decade ago, teachers used to keep the learners in a highly controlled environment and impose lessons of which the students had to memorise almost every bit of content. In such an authoritarian environment, students always had a fear to speak in front of the teachers and so interaction between teacher and student was unlikely to occur. However, observations in this study showed active student engagement in the lab and so indicated a shift in teaching and learning culture. For instance, the students using individual devices expressed their problems to their

teachers without hesitation and were always friendly in communication with teachers and colleagues.

The evidence from this research has shown that the provision of individual devices for learners in the lab motivated the children to do various activities independently and that the teachers realised it decreased the load of explanations they needed to give in each lesson. The teachers in this study perceived that their role in the lab was to be a facilitator in students' learning activities in the lab. Observations revealed that, although teachers moved to the position of a facilitator from the place of the instructor when students would be doing exercises on individual devices independently, teachers were still controlling students' freedom of doing activities by their directive explanations and instructions at the start of each lesson in the lab. However, students' self-motivation to access digital materials independently and their evolving personal skills in using digital devices to achieve their learning goals indicated the beginning of student-centred teaching.

Rural Web Access

The study investigated the way that rural Nepal has been waiting for the development of internet infrastructures and access to web technology. Although published reports show that over fifteen thousand new subscribers are connected to the internet daily (Pokharel, 2016 August 7; retrieved 2017 September 1), the subscribers are mostly from urban areas. Recent records show that about 58.72% of the total population of Nepal has internet access (News24Nepal, 2017 September 1; retrieved 2017 September 11). However, the majority of them are mobile data users, and mobile data is too expensive to use for educational purposes.

Among the five schools involved in this study, Chadani, Dhaulagiri and Ekata schools had possibilities of getting internet facility for educational purposes if they wanted to get it, but Annapurna and Buddha schools did not have the infrastructure to get fibre internet in their areas. The study found that Ekata School unsubscribed from the internet, but the teachers did not like to speak about why the school did that. I found that none of the schools in this study had internet facility and the teachers used offline digital content on the digital devices which was regularly updated by the NGO. The study highlighted that the use of digital technology without web technology in teaching and learning activities was outside the frame of what international literature

emphasises in the use of ICT in teaching and is different than the predominant use of ICT in developed countries.

Partnership with NGOs: Dependency and Future Risk

Examination of policy documents and reports showed that the Government of Nepal does not allocate a budget for ICT infrastructure development in primary schools, nor does it provide ICT training for primary teachers. For the provision of ICT infrastructure and for training on ICT use, the government has established a partnership relation with NGOs such as the Open Learning Exchange (OLE). The evidence from this study has shown that the relationship between the government and NGOs has helped rural primary schools to some extent to bring changes in traditional teaching and learning activities in the classroom. Because the majority of the rural primary schools in this study were struggling to feed locally appointed private teachers, they would not be able to manage to find funds from local resources for installing ICT infrastructure and ICT training for teachers. For example, a local organisation had installed a computer lab in Dhaulagiri School, but the school lost the computer lab in the April 2015 earthquake and could not revive the technology later due to lack of funding.

Moreover, the evidence from this research indicates that the current policy of developing a partnership with NGOs to integrate ICT in education is not ideal for sustaining development for the long term. The participants' experience imply a warning that, if the government does not step in to take responsibility for managing ICT infrastructures and workforce in state schools, even the infrastructure provided by NGOs will not exist after a certain time when they are outdated, and when the NGOs lose their funding and leave the schools on their own. The evidence in the literature as well as in my field work has shown that the current means of equipping primary schools and teachers has increased the country's dependency on foreign funding which comes through international non-governmental organisations (INGOs) to the NGOs, and this indicates a potential risk of managing school education.

Interrelation with World Policy

For the first time, Nepal's *National Curriculum Framework for School Education, 2005* introduced ICT as a separate subject and as a tool to teach other subjects and this

was continued in the reformed curriculum 2007 (MoES, 2005, 2007). The curriculum emphasised the importance of transforming teaching and learning with the integration of ICT, and cited ICT development as a global need for human civilisation. The *School Sector Reform Plan, 2009-15*, *ICT in Education Master Plan, 2013* and *School Sector Development Plan, 2016-23* also focused on educational transformation through the integration of ICT in teaching and learning activities (MoE, 2009, 2013, 2016). However, these policy documents do not state how to develop ICT infrastructure in state primary schools. *The School Sector Reform Plan 2009-15* stated that there is no funding for the programme of ICT education in schools. Even the first policy document *ICT in Education Master Plan, 2013* did not cover how to equip government primary schools with ICT infrastructures and with a skilled workforce, and neither did the *School Sector Development Plan, 2016-23*.

The aspiration of developing *ICT in Education Master Plan, 2013* seems to be an ambitious plan to bring ICT into school education without a strategic plan to equip the schools and teachers. The policy stated that ICT is an effective tool for educational transformation although there is no empirical evidence cited to support the claim. This gap seems to indicate that the policy for ICT education has been developed based on world policy without in-depth study of the native circumstances and without understanding the local context of education. The *School Sector Development Plan, 2016-23* explained that the goal of ICT in education is to integrate Nepal into the global community and enable citizens to participate in the technological world. However, the lack of a strategic plan to produce skilful teachers to handle modern technologies and to develop ICT infrastructure in the colleges of education and in schools indicates that the ICT in education policy is fragile.

On the other hand, the policy has some positive aspects which have allowed local communities and schools to seek financial and logistic support from various sources to develop ICT infrastructures in schools and to train teachers to use digital technology in instructional activities. The flexible policy allows the schools to work with developmental NGOs, and this has benefitted several rural primary schools, at least temporarily. The decentralised school management system has empowered the communities to become involved in plans for the educational development of their schools. It allows individuals, civil society or development organisations to directly support the community schools with finance or logistics. However, the evidence from

this study has shown that community participation in educational activities, particularly in the programme of digital technology use in teaching and learning, is so far nominal.

Earthquake, Destruction of ICT and Hope

The April 2015 earthquake shattered Nepal and killed thousands of people, displaced millions and created a traumatic situation for the survivors. The disaster destroyed 8308 schools, with about 30,756 classrooms destroyed and about 16,813 classrooms partly damaged. It was estimated that over 1.1 million children had been affected and that it caused the loss of about US$7 billion. Dhaulagiri School in this study was one of the major affected schools in Nepal: it lost its entire ICT infrastructure and was unable to revive it. Chadani School in this study was another partly affected school and it lost a building in the earthquake, but the ICT infrastructure remained safe.

The study has explored how the earthquake's impact on ICT infrastructure eventually changed teachers' teaching strategies. The teachers from Dhaulagiri School lamented that the loss of computer technology altered their attempts of changing traditional pedagogies and that they had to return to the traditional way of teaching they were used to before the installation of a computer lab in their school. The study found that a local organisation provided the computer lab for the school, but the school could not obtain further funding after it had lost its entire technology in the disaster. This study also found that the reportedly weak role of the head teacher in coordinating the School Management Committee, teachers and community to search funding resources for reviving ICT infrastructure was a major factor for not being able to reinstate the technology in the school.

However, the study found that the teachers of Dhaulagiri School had not lost their enthusiasm for using ICT in their teaching activities. The teachers' narratives reflected that, although they had some level of frustration about not being able to explore ways of resourcing the technology and not getting any support from the government, they still had a desire to get the technology back into their teaching activities. The earthquake had impeded the utilisation of ICT, but teachers still had a motivation to use ICT. In Chadani School, the teachers observed the earthquake impact on the management of alternative classrooms after the loss of a building, and it influenced the regular use of lab in teaching and learning activities. This study found

that after the earthquakes the teachers had significantly reduced their lab classes throughout the immediately following academic year and they gradually regained their usual practice of ICT in the following year.

Rural Nepal – Isolated in Many Ways

This study has highlighted that rural areas of Nepal are isolated in many ways: by lack of opportunities for a reliable source of income, by distance from government policy, by lack of access to web technology, by resourcing that suggests second-class educational citizenship, and by a recurring legacy of earthquakes. These factors indicate how rural communities are marginalised in terms of policy and how the countryside where they live is under-resourced. National statistical data shows that about 80% of the total population live in rural areas where they have to survive without much expectations of getting the facilities of modern societies in urban areas.

Although the people in rural areas have their small farmland areas to grow crops for their survival, the majority of them do not have a reliable source of income, such as job or business. There might be a small number of people in villages who have access to towns and cities to sell their products and increase their bank savings, but the majority of villagers still reside in traditional communities. This study has highlighted that the people in rural areas cannot afford to buy expensive digital technology due to lack of a cash income. At the same time, it is openly visible that urban people have easier access to global facilities.

This study suggests that the policy of integrating ICT in education is focused on the environment of urban contexts where the infrastructure is developed and where it is likely to get the workforce to execute the plan. However, entire rural areas have a lack of ICT infrastructure and of skilful teachers who know how to use digital technology. Another reality is that the people in rural areas may not have ICT literacy to understand the value of ICT in education. Moreover, the ICT in education policy emphasises the values and practices of ICT from developed countries. It suggests that policymakers who designed the policy sitting in the capital city, Kathmandu, have spun their eyes towards the international reports of practice, without an in-depth study and analysis of the rural context of Nepal.

Existing literature and records show that all the telecommunication companies are business oriented and they are focused on populated urban areas where the people can afford internet facilities. The cities have high-speed broadband, wireless internet and smart technologies which are the fundamentals of ICT in educational practices. The ICT in education policy seems to be coherent with the urban context. However, the rural areas, where there is no telecommunication infrastructure, seems to be forgotten in designing the policy document.

The evidence from this study has shown that rural teachers in Nepal have been working with limited resources, on low paid salary and with the skills they achieved through short-term ICT training. Most teachers in this study had learned basic computer skills when an NGO supported them with computer labs in their schools and provided a short-term training on how to use the digital devices and content. They had limited access or no access to web technology outside their schools. Some of them who were private teachers were working on a low salary and some others with temporary and relief quota status also had a fear of losing their job as soon as the government would appoint permanent teachers. The rural schools were unlikely to gain financial support from their community people who had no reliable source of income. This suggests that the rural teachers have been treated as a second-class educational citizen in their profession when others in urban schools have better access to government facilities.

This study has highlighted that people in rural areas in Nepal are unprepared to survive earthquakes although Nepal lies in an earthquake-prone region. The April 2015 earthquake's impact on social, economic, education and health sectors has shown that the majority of people are always under threat as they live in weak houses, far from health facilities and safety needs. The data from this study has shown that limited ICT or no access to ICT in remote villages in high hills and mountains keeps rural people far away from participating in activities that are commonplace in urban areas and distanced from global information. Limited or no web technology in the rural context of Nepal augmented the difficulty for people during earthquakes who do not get support in time from the government and other organisations and suffer greatly.

The Chasm before the Mountain Top

This study has explored the gap between the rural context and the development of policy that takes place in capital city, Kathmandu. I have also explored the gap between rural practices and what international literature reports about the practice of ICT. Nepal's ICT in education policy seeks to introduce concepts that are found in international literature and global practice of ICT into its own educational activities. However, rural Nepal does not have the fundamental infrastructure to allow the implementation of the policy of ICT integration in education. At some level, the policy may work in urban schools which have possibilities of obtaining modern technological equipment and programmes, internet facility, teacher training in the use of ICT and consistent support for teachers. Teachers and students have access to web technology outside the school in urban areas. This study has shown that there is a gap between the rural context of ICT practice and development of ICT education policy as it is shaped in policy-makers' offices in the capital city of Nepal.

The findings of this study argue that Nepal's approach of eliciting partnerships to integrate ICT in education may seem to be beneficial for a short term in the situation when the government cannot invest in ICT infrastructure and teacher development activities. On the hand, there is a real risk of what will happen when the NGOs terminate their service in the schools and the government cannot take the responsibility to continue the service. The strategy of developing a partnership with NGOs to implement ICT in education policy underlines that the government cannot invest in ICT infrastructure and skill development. Moreover, the rural people cannot afford expensive technology that is available in the international market. It is evident that there is a gap between the reality of the rural context and the ICT in education policy. It is also evident that the government needs to develop a solid and sustainable foundation for the implementation of the policy of ICT in education.

Nepal is a country of lofty mountains, and the government's ambition to transform education through the use of ICT and develop ICT competencies that will align competitively with global trends could be compared to the desire to climb a lofty mountain. But in Nepal's mountain terrain there are also deep chasms: the gap between policy and the resources of rural schools appears to be one such chasm.

Implications of the Study

This study has identified and reported teachers' problems, tensions, and perception of ICT and changes in teachers' classroom teaching. The findings from this study have highlighted practical challenges in implementing policy for ICT in education policy, noted the benefits of involving NGOs in education and warned of future risk. The findings have implications for the development of strategies on how to equip rural schools with ICT infrastructure and how to develop teachers' professionalism in using ICT in teaching.

In order to implement ICT in education policy, the government needs to appoint sufficient teachers in rural schools and provide ICT training in how to use modern technologies in teaching activities. In the long term the government teacher training programmes need to cover ICT training. In the short term there needs to be more co-ordination between government teacher training and NGO provided ICT training in order to cohesively develop teachers' professional skills so that they can keep them up to date with the changing educational practices as well as technologies. However, there is a practical challenge in how the teachers on temporary, relief quota, PCF quota and private status, who do not have job security and particularly PCF and private teachers who are generally paid a low salary, can put the skills they learn into practice in their classroom teaching and improve educational quality. Underpaid and insecure teachers are seldom motivated to expand their professional learning,

The rural areas need to have solid infrastructures for ICT, and rural people need to have access to technology to be able to integrate ICT in educational activities successfully. The practice of just allowing development NGOs to install a computer lab in the schools and to provide short training on how to use the digital devices does not assure the implementation of ICT as it is envisioned in education policy. It does not seem possible to achieve the goal of Nepal's national education policy without the government's active role in the implementation of the programme. Therefore, the government needs to take the responsibility of continuing the service although, initially, NGOs may continue to support some rural schools with ICT infrastructure and teacher training. While talking about the active role of the government in the implementation of ICT in education policy, questions arise about what will happen when the NGOs stop their project, and the government cannot invest in the project. It

also needs to be asked whether it is the right time to start an educational ICT project without also developing essential ICT infrastructures, such as internet access, in rural areas.

This study has found a gap between the vision of ICT in education policy and the reality of resources in the rural context in Nepal. It appears essential for policy makers to study the rural context and critically analyse the practical application of international ICT practices before imposing the national education policy on rural people who are just surviving on limited sources. Moreover, even the provision of ICT infrastructures in rural schools will not achieve the policy goals without the development of ICT literacy in teachers and community people. This study has drawn attention to the facts that in rural Nepali schools' teachers are relying on a short-term ICT training, that existing pre-service qualifications do not cover ICT education, and that schools have limited or no access to web technology. The study raises the question of how the government can expect to achieve the goal of transforming traditional pedagogy with ICT integration if it does not provide training or resources.

This study found evidence that teachers were able to engage learners in learning activities by providing individual devices in the lab which contained practice-oriented audio and visual content. However, the direction of learners' self-learning activities in most cases that I observed tended to be influenced by teachers' directive instructions and explanations, particularly at the start of each lesson. The implication is that further professional development is needed to support teachers' practice. It could be advantageous for such programmes to target the groups of teachers in their own schools. This would enable them to develop teaching skills in the actual working environment.

The study highlighted the way that the April 2015 earthquake impacted on thousands of rural schools: one of the five schools studied had lost its whole technology system and another suffered severely reduced access to its lab throughout the academic year. When a school lost its computer lab in the earthquake, teachers in the school reverted to their previous traditional teaching strategies. Although Nepal is an earthquake-prone country, people in rural areas are not equipped to keep themselves safe from such a devastating disaster. The development of rural internet access and ICT

infrastructures could potentially aid people in the face of earthquakes and other natural disasters, as well as providing resource for schools.

The Contribution of this Study to New Knowledge

There is a gap in published research about the ICT practices of rural primary teachers in Nepal and about their perceptions of the value and use of ICT. This thesis contributes to filling that gap: it reports teachers' ICT practice in five, variously situated, rural primary schools. It examines how their use of digital technology in instructional activities has enhanced their use of the printed textbook in their daily teaching activities and students' learning, even though they do not have access to the technology outside their schools.

Closely aligned with investigation of rural primary teachers' practice is my investigation of their perceptions of the role of NGOs, of the resources they provide and of the training they give. In my review of the literature, I noted that there are many criticisms of the roles played by NGOs. The rural teachers I interviewed tended to see the NGO they worked with as a noble agent who supported their schools with both ICT equipment and teacher training on how to use the technology. In a context where the government does not provide any support for the programme of ICT integration in school education, the support of NGO is a significant contribution to bringing about change in traditional teaching methods. The teachers perceived the ICT training given by the NGO as the source of new skills. The teachers' perceptions do not negate the criticisms made in the literature reviewed. However, their experiences and perceptions add to the range of evaluations.

A further contribution of this thesis is the juxtaposition of government policy with rural resources and practice. I have reviewed in detail the education policies, and associated reports that aim to transform traditional education system with the integration of ICT in education and of the measures, or lack of measure introduced to prepare teachers for the task. I have not found a comprehensive review of government action and inaction in this field in the existing literature and it is important to examine the context in which ICT practice is expected from rural schools as well as to examine what teachers in rural primary schools actually do with digital technology. The policy

emphasises that the use of ICT in teaching and learning can equip the growing generation of youths with skills and integrate them in the global technological market. However, the government does not invest in ICT education programme and encourages development NGOs to invest in this programme. Rural primary teachers rely on the resources provided by the NGOs and on their short-term ICT training. The exploration of this contextual platform can contribute to future remodelling of strategies for partnership with NGOs.

The thesis has identified a significant gap between the processes, aspirations and problems discussed in international literature about the use of ICT in education and rural resources and possibilities in Nepal. Nepal's policy for ICT in education tries to adopt global practices of ICT in educational activities, but rural schools and teachers do not have global technology infrastructures. A few rural primary schools including those in this study have computer labs and digital content supported by NGOs. The teachers in those schools are trained to use the technology by the NGOs. Teachers and students in the schools have limited or no access to web technology. Recognition of this difference in resources and potentialities is important as it may help both policy-makers and researchers avoid imposing international expectations of ICT on rural Nepali schools.

In addition, because of the circumstances of timing, this thesis has reported the effect of the 2015 earthquakes on social, economic and educational aspects and on the use of ICT in teaching activities in a rural school. When the earthquake destroyed the whole infrastructure, including the computer lab of a school involved in this study, teachers in the school had to revert to their previous teaching strategies. In this school, as well as thousands of other schools which lost all infrastructures, it would cost a considerable amount of budget to rebuild buildings and classrooms. Although this earthquake was a particularly severe one, substantial earthquakes regularly trouble Nepal and are to be expected in the future. They are a factor that needs to be considered in educational research, but are seldom discussed beyond the context of disaster reports. Thus, this account serves as reminder that educational planning and proposals for change needs to consider major earthquakes as a continuing possibility within the context.

Recommendations

The following recommendations are offered on the basis of the findings of this study.

Strategic Plan for Equipping Schools with ICT Infrastructure

Recommendation for policymakers/government bodies

It is recommended that, as well as providing policy guidelines, the government develops a strategic plan for equipping educational institutions and teachers with ICT infrastructure and skills, and for providing continuous support for their professional development. It is essential to develop an alternative government fund to repair and replace digital technology in schools because the NGOs provide the technology only once but do not replace the old digital devices with new ones. Also, it is essential to communicate the government strategy to all local authorities and schools, regardless of location, so that they understand and can better participate in implementation.

Community Participation in ICT Infrastructure Development

Recommendation for DEOs/SMCs/head teachers

When the schools adopted digital technology in teaching and learning activities, only the teachers were trained to use them in teaching activities. Therefore, it is recommended that parents and community members should be given basic knowledge about ICT and involved in the management of such an expensive technology to keep it alive in the school. Community participation in ICT management in the schools can strengthen children's learning with the technology and support schools to raise fund for the technology in the future. Furthermore, communities could benefit from greater access to internet and other communication resources, both to alert them of natural disasters and to enable them to better communicate in their aftermath.

Teachers' Professional Development in ICT

Recommendation for DEOs/SIs/RPs/head teacher/teachers

Government teacher training programmes are still focused on old model teaching methods which do not cover the integration of modern technologies. Therefore, government training programmes should be better aligned with the ICT training programmes of NGOs to transform teachers' traditional teaching strategies to modern learning methods, to make training productive and to achieve educational goals. It is

essential that teachers, who are the main agents to make changes in education, could be enabled to explore the potential of digital technologies.

Support for Inclusion of ICT in Teacher Education

Recommendation for MoE/Universities/Training Centers/DEOs/SMCs/head teachers

It is essential that teacher education could rigorously pursue the integration of ICT in the teaching programmes and prepare prospective teachers who can understand the changing environment of global education, the needs of the growing generation youths and their future values for survival. However, teacher education in Nepal does not cover ICT education but rather maintains traditional education systems. Therefore, it is recommended that the government could redesign the teacher education approach in universities and in-service teacher professional development programmes to develop a new education model and to produce skilled workforce for the nation. Likewise, in-service teachers need to be consciously provided moral, social and training support to motivate them to use new technology in teaching activities effectively.

Finally

This study has examined how the Government of Nepal has considered ICT integration in education as a need of contemporary society and the extent to which such integration has been realised in rural primary schools. The development of ICT in education policy, its introduction in the curriculum and the involvement of NGOs in equipping rural primary schools with computer lab and ICT training for teachers are significant initiatives to change traditional pedagogies to modern teaching and learning strategies. However, this study highlights the gap between policy aspirations and the realities that constrain rural practice. It argues that for the policy to be realised the government not only needs to develop strategies of how to equip all the schools in the country and train teachers to use available digital technologies, but also needs to carefully study the socio-economic and physical challenges embedded in rural communities where the majority of the people live. Such challenges include the relative poverty of rural people who are without reliable sources of income and savings, the dominance of high mountains where it is costly to develop ICT infrastructures, the dependency on the temporary contribution of NGOs and the

continuous expectation of major earthquakes like the ones in 2015. If the goal of transforming education and bringing Nepali people into global systems of communication is to be more than rhetoric, then well researched and realistic strategies for implementation need to be developed. There are high mountains, and numerous ravines, that still need to be navigated.

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Appendices

Appendix A: Ethics Approval

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen
Email: human-ethics@canterbury.ac.nz

Ref: 2015/28/ERHEC

9 September 2015

Karna Rana
School of Teacher Education
UNIVERSITY OF CANTERBURY

Dear Karna

Thank you for providing the revised documents in support of your application to the Educational Research Human Ethics Committee. I am very pleased to inform you that your research proposal "In-service teachers ICT practice in rural primary schools in Nepal" has been granted ethical approval.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 7 September 2015.

Should circumstances relevant to this current application change you are required to reapply for ethical approval.

If you have any questions regarding this approval, please let me know.

We wish you well for your research.

Yours sincerely

Nicola Surtees
Chair
Educational Research Human Ethics Committee

"Please note that Ethical Approval and/or Clearance relates only to the ethical elements of the relationship between the researcher, research participants and other stakeholders. The granting of approval or clearance by the Ethical Clearance Committee should not be interpreted as comment on the methodology, legality, value or any other matters relating to this research."

F E S

Appendix B: Information sheet for head teacher

To
The head teacher
……School…… Nepal

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

'In-service Teachers' ICT Practice in Rural Primary Schools in Nepal'

Information Sheet for Head Teacher

I am Karna Rana, a PhD (Doctor of Philosophy) student in University of Canterbury, Christchurch, New Zealand. My intended research is based on Nepalese primary schools. I would like to undertake my research in your school. My research is on 'in-service teachers' ICT practice in rural primary schools in Nepal'. The study will explore how primary school teachers use ICT in their teaching and learning plans and during delivery of their plans in the classrooms. The study will also investigate how and why the digital technology has been integrated in classroom teaching and learning activities and how ICT was impacted by the major earthquake in April 2015. It is hoped that the research outcome will provide significant ground for rethinking, reforming, planning, designing and implementing educational strategies in Nepal and similar context.

For the purpose of research, normal classes of three or four teachers in your school will be observed at least seven times over a three month period. Observations will be followed by semi-structured interviews with the teachers whose classes are observed after their class or outside the school. To assist researcher recall, interviews will be recorded on audio device.

Your involvement in this research will be voluntary. Should you agree to participate, you have right to withdraw at any time without any penalty. In case you withdraw your consent, all the information you provided will be removed from my record.

The results of the research will be published but you are assured of the complete confidentiality of information gathered in this investigation. Your identification as well as your school identification will not be published without your prior consent. Only the researcher, supervisors and authorised members of University of Canterbury will have access to the information you have provided. The information will be stored on my personal computer locked with password and on official computer of University of Canterbury for the next ten years. It will be then destroyed after the stated period. A dissertation is a public document that will be available through University of Canterbury library. The researcher may not be able to assure anonymity of pictures/video images if included in the dissertation.

The research is being carried out as a requirement of Doctor of Philosophy under the supervision of Prof Janinka Greenwood, Dr Wendy Fox-Turnbull and Dr Stuart Wise, who can be contacted at janinka.greenwood@canterbury.ac.nz, wendy.fox-turnbull@canterbury.ac.nz and stuart.wise@canterbury.ac.nz in University of Canterbury, New Zealand. They will be pleased to discuss any concerns you may have about your participation in the project.

This project has been reviewed and approved by the University of Canterbury Educational Research Human Ethics Committee, and participants should address any complaints to The Chair, Educational Research Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you agree to participate in the study, you are asked to complete the consent form and return to ….

Karna Rana
School of Teacher Education
University of Canterbury, Christchurch, New Zealand
Phone No.: 00977-9841253345 (NP), 0064-226903808 (NZ)
E-mail: karna.maskirana@pg.canterbury.ac.nz

Appendix C: Consent form for head teacher

School of Teacher Education
University of Canterbury, Christchurch, New Zealand
Phone No.: 00977-9841253345 (NP), 0064-226903808 (NZ)
E-mail: karna.maskirana@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

'In-service Teachers' ICT Practice in Rural Primary Schools in Nepal'

Consent Form for Head teacher

- I have been given a full explanation of this project and have had the opportunity to ask questions.
- I understand what is required of my school if I agree to take part in the research.
- I understand that participation is voluntary and I may withdraw at any time without penalty. Withdrawal of participation will also include the withdrawal of any information I have provided should this remain practically achievable.
- I understand that any information or opinions I provide will be kept confidential to the researcher, supervisors and authorized members of University of Canterbury, New Zealand who have access to the information and that any published or reported results will not identify participant teachers of my school as well as my school.
- I understand that a dissertation is a public document and will be available through the UC Library.
- I understand the risks associated with taking part and how they will be managed.
- I understand that I am able to receive a report on the findings of the study by contacting the researcher at the conclusion of the project.
- I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form next ten years. This will be destroyed after the stated period.
- The anonymity may not be guaranteed if the pictures/video images are used in the dissertation.
- I understand that I can contact the researcher, Karna Rana at karna.maskirana@pg.canterbury.ac.nz or supervisors Prof Janinka Greenwood at janinka.greenwood@canterbury.ac.nz, Dr Wendy Fox-Turnbull at wendy.fox-turnbull@canterbury.ac.nz and Dr Stuart Wise at stuart.wise@canterbury.ac.nz for further information.
- If I have any complaints, I can contact the Chair of the University of Canterbury Educational Research Human Ethics Committee, Private Bag 4800, Christchurch (humanethics@canterbury.ac.nz)

By signing below, I agree to participate in this research project.

Note: Would you like to receive a report on the findings of the study? Yes ☐ No ☐

Name: .....

Date: ..... Signature: .....

Please return this form after it is signed to Karna Rana or email scanned copy at karna.maskirana@pg.canterbury.ac.nz.

Appendix D: Information sheet for teacher

To
The teacher
……School,…… Nepal

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

In-service Teachers' ICT Practice in Rural Primary Schools in Nepal

Information Sheet for Teacher

I am Karna Rana, a PhD (Doctor of Philosophy) student in University of Canterbury, Christchurch, New Zealand. My intended research is based on Nepalese primary schools. I would like to undertake my research in your class. My research is on 'in-service teachers' ICT practice in rural primary schools in Nepal'. The study will explore how primary school teachers use ICT in their teaching and learning plans and during delivery of their plans in the classrooms. The study will also investigate how and why the digital technology has been integrated in classroom teaching and learning activities and how ICT was impacted by the major earthquake in April 2015. It is hoped that the research outcome will provide significant ground for rethinking, reforming, planning, designing and implementing educational strategies in Nepal and similar context.

For the purpose of research, I would like to observe your normal classes at least seven times over a three month period. Observations will be followed by semi-structured interviews with you after class or outside the school. To assist researcher recall, interviews will be recorded on an audio device. If you are intended to check the transcription of your interview and observations, the researcher will be pleased to offer you the chance.

Your involvement in this research will be voluntary. Should you agree to participate, you have right to withdraw at any time without any penalty. In case you withdraw your consent, all the information you provided will be removed from my record.

The results of the research will be published but you are assured of the complete confidentiality of information gathered in this investigation. Your identification will not be published without your prior consent. Only the researcher, supervisors and authorised members of University of Canterbury will have access to the information you have provided. The information will be stored on my personal computer locked with password and on official computer of University of Canterbury for the next ten years. A dissertation is a public document that will be available through University of Canterbury library. The researcher may not be able to assure anonymity of pictures/video images if included in the dissertation.

If you wish to get a copy of research results, you can contact the researcher at the end of the project.

The research is being carried out as a requirement of Doctor of Philosophy under the supervision of Prof Janinka Greenwood, Dr Wendy Fox-Turnbull and Dr Stuart Wise, who can be contacted at janinka.greenwood@canterbury.ac.nz, wendy.fox-turnbull@canterbury.ac.nz and stuart.wise@canterbury.ac.nz in University of Canterbury, New Zealand. They will be pleased to discuss any concerns you may have about your participation in the project.

This project has been reviewed and approved by the University of Canterbury Educational Research Human Ethics Committee, and participants should address any complaints to The Chair, Educational Research Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you agree to participate in the study, you are asked to complete the consent form and return to ….

Karna Rana
School of Teacher Education
University of Canterbury, Christchurch, New Zealand
Phone No.: 00977-9841253345 (NP), 0064-226903808 (NZ)
E-mail: karna.maskirana@pg.canterbury.ac.nz

Appendix E: Consent form for teacher

School of Teacher Education
University of Canterbury, Christchurch, New Zealand
Phone No.: 00977-9841253345 (NP), 0064-226903808 (NZ)
E-mail: karna.maskirana@pg.canterbury.ac.nz

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

'In-service Teachers' ICT Practice in Rural Primary Schools in Nepal'

Consent Form for Teacher

- I have been given a full explanation of this project and have had the opportunity to ask questions.
- I understand what is required of me if I agree to take part in the research.
- I understand that participation is voluntary and I may withdraw at any time without penalty. Withdrawal of participation will also include the withdrawal of any information I have provided should this remain practically achievable.
- I understand that any information or opinions I provide will be kept confidential to the researcher, supervisors and authorized members of University of Canterbury, New Zealand who have access to the information and that any published or reported results will not identify the participants and their schools.
- I understand that a dissertation is a public document and will be available through the UC Library.
- I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form and will be destroyed after ten years. This will be destroyed after the stated period.
- I understand the risks associated with taking part and how they will be managed.
- I understand that I am able to receive a report on the findings of the study by contacting the researcher at the conclusion of the project.
- I understand that the anonymity may not be guaranteed if the pictures/video images are used in the dissertation.
- I understand that I can contact the researcher, Karna Rana at karna.maskirana@pg.canterbury.ac.nz or supervisors Prof Janinka Greenwood at janinka.greenwood@canterbury.ac.nz, Dr Wendy Fox-Turnbull at wendy.fox-turnbull@canterbury.ac.nz and Dr Stuart Wise at stuart.wise@canterbury.ac.nz for further information. If I have any complaints, I can contact the Chair of the University of Canterbury Educational Research Human Ethics Committee, Private Bag 4800, Christchurch (humanethics@canterbury.ac.nz).

By signing below, I agree to participate in this research project.

Note: Would you like to receive a report on the findings of the study? Yes ☐ No ☐

Name: .....

Date: ..... Signature: .....

Please return this form after it is signed to Karna Rana or email scanned copy at karna.maskirana@pg.canterbury.ac.nz.